Cruise Report
U.S. Geological Survey Research Cruise 2016-666-FA and 2016-668-FA (R/V Shearwater leg)
Santa Barbara, California
September 19th-28th, 2016
Principle Investigator: Jared Kluesner, USGS geophysicist
Report prepared by Steve Hartwell, USGS

Summary

From September 19th-28th, 2016, the Pacific Coastal and Marine Science Center of the U.S Geological Survey (USGS) conducted a 48-channel sparker seismic survey within the western Santa Barbara Channel. The survey was conducted aboard the NOAA Channel Islands National Marine Sanctuary R/V Shearwater, using a 1000 Joule sound source, 48-channel digital multichannel streamer and a calibrated source hydrophone. The survey was conducted out of the Santa Barbara Harbor where R/V Shearwater is stationed. The water depths of the survey were approximately between 50 m and 700 m.

A primary mission for the USGS Coastal and Marine Geology Program is to identify offshore earthquake and tsunami hazards. Under this mission the Pacific Coastal and Marine Science Center has been studying faults and submarine landslides located offshore Southern California, a region that accommodates up to 20% of the Pacific-North America Plate boundary motion. This work occured primarily in federal waters and was designed to support USGS Marine Geologic Hazards Assessment projects, and also complement the seafloor mapping data collected in adjacent State Waters for the collaborative, multi-agency, California Seafloor Mapping Program (CSMP; http://walrus.wr.usgs.gov/mapping/csmp/). The geophysical survey provided critical sub-bottom constraints for faulting, fluid-flow and submarine landslide failure within the Santa Barbara Basin. This work mapped active faults, submarine landslides, seafloor seeps, and provided a 4D analysis of bathymetric (seafloor) changes over the past 20 years within the western Santa Barbara Channel. Measuring such changes in 4D will provide a better understanding of potentially tsunamagenic seafloor failure processes occurring along the shelf edge and continental slope. In addition, information gained during this study will provide insight into fault slip rates and earthquake recurrence intervals. Such information is used to inform building codes, conduct risk assessments, and determine insurance rates, and has significant economic impact. The survey targets also extended into California State Waters, the Point Conception State Marine Reserve and Kashtayit State Marine Conservation area, and were approved under California State Lands Geophysical Permit **#PRC 8394**.

There were two professionally trained protected species observers on board at all times, plus a highly skilled crew from the *R/V Shearwater.* All conditions and monitoring and mitigation measures described in the USGS handbook for application of the DOI Categorical Exclusion on non-destructive surveys were strictly observed.

USGS research cruise 2016-666-FA and 2016-688-FA took place between September 19th and 28th, 2016. All survey lines within state waters were conducted during daylight hours (0730-1600). All seismic profiles were collected using a low-energy sparker sound source (1000 Joule), 48-channel digital multichannel streamer and calibrated source hydrophone, at speeds between 4.5-5.5 nautical miles/hour. 19 marine mammals were observed within state waters, with each observation listed in Table 1 and 2. Track lines and the location of each observation are shown in Figure 1, and the start and end location of each track line is listed in Table 3 and 4.

Entry	Date	Time	Latitude	Longitude	Heading	Speed	Species	Number	Distance(m)	Direction	Behavior	Comment
MO-11	9/21/2016	20:57:56	34.43621683	-120.2347637	322	5.6	Dolphins	10	100	0	swimming	
MO-12	9/21/2016	0:14:06	34.45055067	-120.32355	342	5	California sea lion	1	50	180	jump	shutdown
MO-16	9/21/2016	18:34:19	34.41910517	-120.1181462	174	4.9	Dolphins	20	50	270	swimming, diving, foraging	shutdown
MO-23	9/23/2016	15:50:43	34.38689233	-119.851825	284	5	Dolphins	<20	600	270	swimming, diving, foraging	
MO-24	9/23/2016	16:23:48	34.4019995	-119.9048733	289	4.8	California sea lion	1	150	0	swimming, diving, foraging	
MO-25	9/23/2016	19:41:10	34.362559	-119.8674293	214	5.2	Dolphins	20	300	10	swimming, diving, foraging	
MO-28	9/24/2016	20:53:02	34.41703733	-119.9939287	99	5.9	California sea lion	1	30	0	swimming	shutdown

Table 1. Marine mammal observations 2016-666-FA

Entry	Date	Time	Latitude	Longitude	Heading	Speed	Species	Number	Distance(m)	Direction	Behavior	Comment
MO-1	9/26/2016	16:36:35	34.01315183	-120.275813	171.7	6.5	California sea lion	1	50	10	jump	shutdown
MO-2	9/26/2016	18:01:22	34.01079833	-120.291985	7.1	4.1	California sea lion	1	150	340	foraging	
MO-3	9/26/2016	18:08:22	34.01563183	-120.2965678	252.5	6	California sea lion	1	10	20	jump/swimming	in transit
MO-4	9/26/2016	19:37:58	33.9932685	-120.273551	67.4	5.2	Dolphins	~10	200	30	swimming	
MO-5	9/26/2016	19:41:13	33.99714967	-120.2735353	291.4	5.9	California sea lion	1	90	90	jump	in transit
MO-6	9/26/2016	20:22:37	34.000802	-120.2777277	93.6	5.3	Dolphins	1	250	345	jump	
MO-7	9/26/2016	20:33:48	34.00543183	-120.2805318	270.1	5.5	California sea lion	1	20	345	jump	shutdown
MO-8	9/26/2016	21:02:24	34.01029817	-120.301784	89	5	California sea lion	1	10	0	jump	shutdown
MO-9	9/26/2016	21:12:13	34.00984683	-120.2878783	88.2	4.3	California sea lion	1	150	350	foraging	
MO-10	9/26/2016	22:50:19	34.0074565	-120.2827142	87.3	5.3	California sea lion	2-3	150	10	jump/swimming	
MO-11	9/26/2016	1:08:20	34.0010105	-120.2897127	185.3	3.7	California sea lion	1	140	0	jump	
MO-12	9/26/2016	1:37:05	34.01501283	-120.283672	355.2	5.9	California sea lion	1	140	340	jump	

Table 2. Marine mammal observations 2016-668-FA

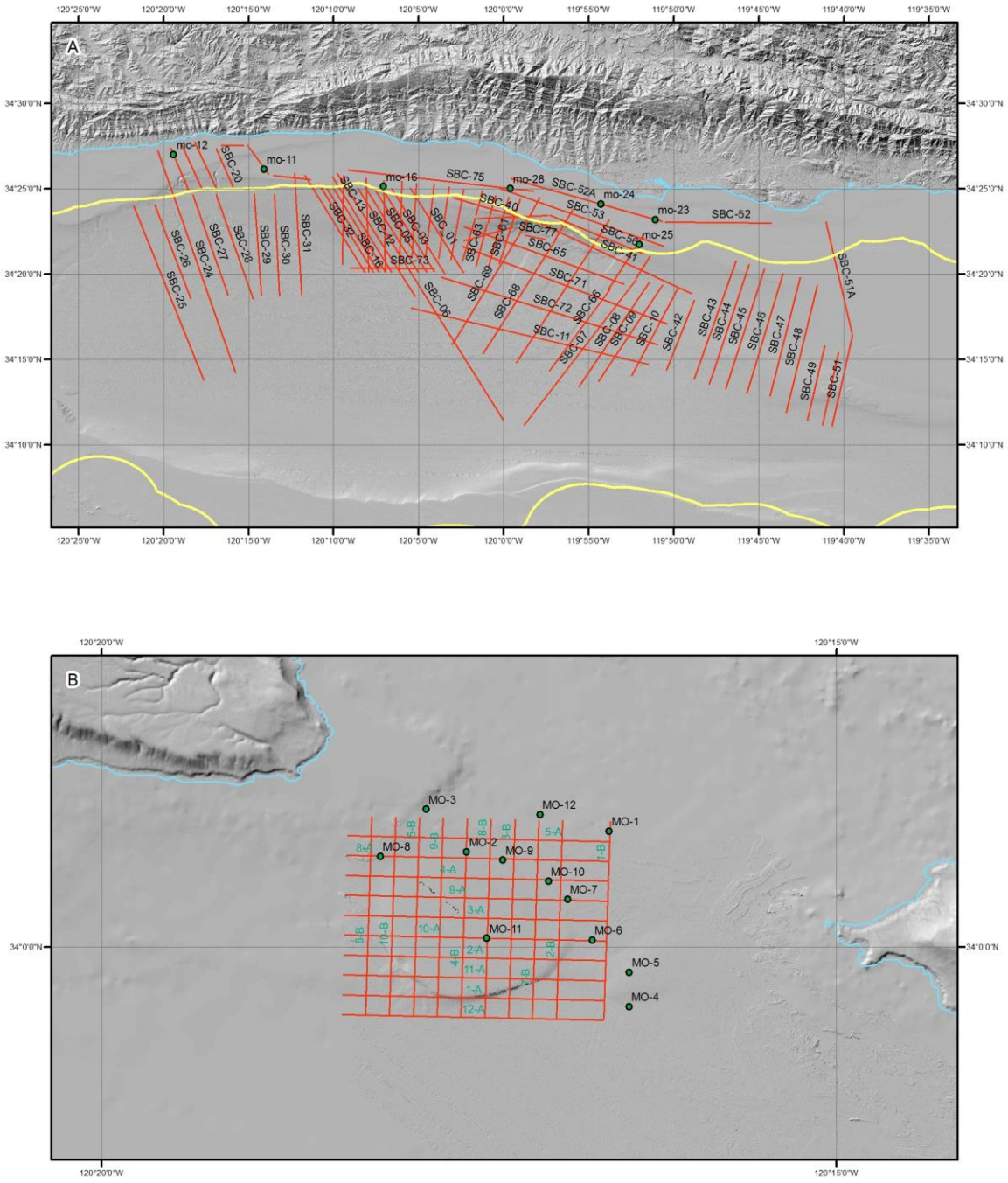

Figure 1. A) Track lines (red), mommal observation locatios within state waters (green dot), with state waters limit (yellow) for cruise 2016-666-FA.
B) Track lines (red), mommal observation locatios (green dot) for cruise 2016-668-FA.

Line	Start Latitude	Start Longitude	End Latitude	End Longitude
SBC-01	34.33444343	-120.0391533	34.4179554	-120.0919809
SBC-02	34.41715346	-120.1100335	34.33383416	-120.0576049
SBC-03	34.33524079	-120.0677626	34.41703216	-120.1193214
SBC-04	34.41792289	-120.1275054	34.33465705	-120.0750762
SBC-05	34.33495565	-120.0834012	34.41821833	-120.135839
SBC-06	34.41800803	-120.1433857	34.19015247	-120.000247
SBC-07	34.18539525	-119.9803574	34.32795312	-119.8700963
SBC-08	34.3257664	-119.8567921	34.22311847	-119.9264809
SBC-09	34.22811345	-119.9074398	34.32309535	-119.84423
SBC-10	34.31968789	-119.829226	34.23377159	-119.8748046
SBC-11	34.24526744	-119.8573336	34.30011431	-120.0906821
SBC-12	34.31106207	-120.0862127	34.43206729	-120.1633476
SBC-13	34.42857672	-120.1679518	34.33476474	-120.1098214
SBC-14	34.33466326	-120.1156347	34.41891664	-120.1679096
SBC-15	34.42020038	-120.1750507	34.33478948	-120.1220977
SBC-16	34.33466256	-120.127256	34.4220452	-120.1814877
SBC-17	34.42583499	-120.1883817	34.42937453	-120.2256684
SBC-18	34.43070108	-120.2302652	34.45971973	-120.2512065
SBC-19	34.45936305	-120.2541043	34.45930985	-120.276855
SBC-20	34.45646851	-120.2818704	34.41827158	-120.2652909
SBC-21	34.41756841	-120.2817077	34.46263407	-120.3029792
SBC-22	34.45993972	-120.3156282	34.41438743	-120.2946651
SBC-23	34.41567328	-120.308877	34.45687443	-120.3261568
SBC-24	34.45403439	-120.3392313	34.23648103	-120.262688
SBC-25	34.22943102	-120.2937809	34.40066353	-120.3626403
SBC-26	34.40161881	-120.3421076	34.30945965	-120.3065076
SBC-27	34.31264178	-120.2701889	34.41098444	-120.3043416
SBC-28	34.41158351	-120.2816793	34.3087807	-120.2451056
SBC-29	34.31190068	-120.2375698	34.41198365	-120.2444527
SBC-30	34.41152933	-120.2243726	34.31108048	-120.219508
SBC-31	34.31252255	-120.1981838	34.43228668	-120.2046551
SBC-32	34.43019736	-120.1950156	34.33494557	-120.1360292
SBC-33	34.33485359	-120.1323748	34.42735114	-120.1345677
SBC-34	34.42454947	-120.1176398	34.33511228	-120.1162707
SBC-35	34.33430515	-120.1024168	34.4239699	-120.0999032
SBC-36	34.42240353	-120.0854139	34.34961264	-120.0899868
SBC-37	34.35023609	-120.0765305	34.42104605	-120.0681407
SBC-38	34.41860891	-120.0531849	34.34823261	-120.0638488
SBC-39	34.34662718	-120.0520646	34.41675261	-120.0388933
SBC-40	34.40789607	-120.0492771	34.38343189	-119.9644555
SBC-41	34.38345685	-119.9646409	34.31412903	-119.8156241
SBC-42	34.30823657	-119.8131889	34.23916136	-119.8408368

SBC-43	34.23050264	-119.8136535	34.34650912	-119.7722391
SBC-44	34.34328637	-119.7592492	34.22547202	-119.7986295
SBC-45	34.22111989	-119.7823281	34.33866536	-119.7444165
SBC-46	34.33462888	-119.7263616	34.21666741	-119.7617443
SBC-47	34.21393592	-119.7391711	34.3302693	-119.7096065
SBC-48	34.3225021	-119.6927678	34.19795443	-119.7232089
SBC-49	34.19003073	-119.7023507	34.2637714	-119.6853098
SBC-50	34.25707709	-119.6719071	34.18535755	-119.6878844
SBC-51	34.18438113	-119.678266	34.27433444	-119.6582243
SBC-51A	34.27493084	-119.6586422	34.38454724	-119.6844154
SBC-52	34.3834444	-119.7372132	34.38403115	-119.8414928
SBC-52A	34.38447952	-119.8443739	34.4268948	-119.9927729
SBC-53	34.41718143	-120.0040346	34.36077759	-119.8430856
SBC-54	34.37231758	-119.8627098	34.31769617	-119.8979304
SBC-55	34.32897751	-119.870234	34.35126098	-119.8566715
SBC-56	34.35330843	-119.862962	34.39109814	-119.9552818
SBC-57	34.39069951	-119.9561216	34.38774228	-120.0260198
SBC-58	34.39062605	-120.0274745	34.41520591	-120.0209364
SBC-59	34.41050282	-120.0078789	34.38344842	-120.0156414
SBC-60	34.37872795	-120.0041136	34.4086552	-119.9948518
SBC-61	34.40687866	-119.9839945	34.34337848	-120.0044789
SBC-62	34.33973056	-120.0146724	34.37819713	-120.004624
SBC-63	34.38237771	-120.0163462	34.34100335	-120.027145
SBC-64	34.345532	-120.0403946	34.38875792	-120.0279183
SBC-65	34.37983366	-120.0392601	34.32340691	-119.8816043
SBC-66	34.31903638	-119.8956599	34.23829298	-119.9556782
SBC-67	34.24631154	-119.9878357	34.35490715	-119.9159884
SBC-68	34.36854284	-119.9485318	34.2553283	-120.0203961
SBC-69	34.26418226	-120.0506119	34.37545613	-119.9826257
SBC-70	34.37917498	-119.9902333	34.36598441	-120.0388688
SBC-71	34.36033656	-120.0405019	34.28435326	-119.839441
SBC-72	34.26413677	-119.8487409	34.33028629	-120.061161
SBC-73	34.3387654	-120.0671102	34.3394841	-120.1508145
SBC-74	34.34226848	-120.1580775	34.42971238	-120.1568724
SBC-75	34.43494185	-120.1525405	34.41430585	-119.9701888
SBC-76	34.40828396	-119.9645554	34.37456212	-119.9832226
SBC-77	34.37123397	-119.9789875	34.36708571	-119.9577248
SBC-78	34.36671515	-119.9495941	34.39706192	-119.931811
SBC-79	34.38647957	-119.8966036	34.35307661	-119.917345

Table 2. Coordinates for the beginning and end of each line for cruise 2016-666-FA.

Line	Start Latitude	Start Longitude	End Latitude	End Longitude
1-A	33.9939413	-120.2763156	33.99459666	-120.3060589
1-B	34.01421086	-120.275668	33.99168913	-120.2763875
2-A	33.99910113	-120.3059166	33.99844566	-120.2761718
2-B	33.99180881	-120.2817952	34.0143301	-120.2810771
3-A	34.00295	-120.2760279	34.00360558	-120.3057742
3-B	34.01444935	-120.2864862	33.99192825	-120.2872029
4-A	34.00811004	-120.3056319	34.00745435	-120.2758839
4-B	33.99204746	-120.2926106	34.0145686	-120.2918954
5-A	34.01195869	-120.27574	34.01261449	-120.3054896
5-B	34.01468785	-120.2973046	33.99216642	-120.2980184
6-B	33.99228516	-120.3034262	34.01480709	-120.3027138
7-B	33.99186856	-120.284499	34.01438973	-120.2837817
8-A	34.01036227	-120.3055607	34.00970652	-120.275812
8-B	34.01450897	-120.2891908	33.99198788	-120.2899068
9-A	34.00520218	-120.2759559	34.00585781	-120.3057031
9-B	34.01462822	-120.2946	33.99210697	-120.2953145
10-A	34.00135336	-120.3058454	34.00069783	-120.2760998
10-B	33.99222582	-120.3007223	34.01474747	-120.3000092
11-A	33.99619348	-120.2762437	33.9968489	-120.3059877
12-A	33.99234443	-120.3061301	33.99168913	-120.2763875

Table 3. Coordinates for the beginning and end of each line for cruise 2016-668-FA.

Appendix A: Marine Environmental Variables

Date: 9/19/16 — Monitor:Sam Johnson and Steve Hartwell

Time	Latitude	Longitude	Activity	Weather	Cloud cover	Glare	Visibility	Wind speed	Sea State	Swell Height	Comments
700	32d22.48'	119d43.08'	Transit	overcast	low	none	500m	2nm	calm	1-2'	departure from Santa Barbara Harbor
946	34d19.23'	121d01.71'	survey	overcast	low	medium	2000m	0-2nm	calm	1-2'	deployed seismic gear
1820	34d2451'	120d07.79'	survey	sunny	high	low	10km	8nm	slight chop	1'	

Date: 9/20/16 — Monitor:Sam Johnson/Steve Hartwell

Time	Latitude	Longitude	Activity	Weather	Cloud cover	Glare	Visibility	Wind speed	Sea State	Swell Height	Comments
641	34d18.35'	120d05.32'	survey	overcast	low	none	10km	2nm	calm	<1'	low light sunrise
1233	34d21.64'	120d08.26'	survey	overcast	low	medium	10km	17nm	chop	<1'	

Date: 9/21/16 — Monitor:Sam Johnson/Steve Hartwell

Time	Latitude	Longitude	Activity	Weather	Cloud cover	Glare	Visibility	Wind speed	Sea State	Swell Height	Comments
640	34d18.96'	120d13.118'	survey	hazy	none	none	500m	4km	slight chop	1'	Smoke from Vandenberg fire is cauing haze
1330	34d23.71'	120d08.26'	survey	hazy	none	medium	2000m	5km	chop	2'	

Date: 9/22/16 — Monitor:Sam Johnson/Steve Hartwell

Time	Latitude	Longitude	Activity	Weather	Cloud cover	Glare	Visibility	Wind speed	Sea State	Swell Height	Comments
640	34d17.50'	119d12.00'	survey	hazy	none	none	5km	14nm	chop	2-3'	

Date: 9/23/16 — Monitor:Sam Johnson/Steve Hartwell

Time	Latitude	Longitude	Activity	Weather	Cloud cover	Glare	Visibility	Wind speed	Sea State	Swell Height	Comments
706	34d24.42'	119d41.08'	transit	hazy/clear	none	low	5km	8nm	slight chop	1-2'	
1550	34d24.77'	120d01.26'	survey	slight haze	none	low	10km	19km	chop	1-2'	

Date: 9/24/16 — Monitor:Sam Johnson/Steve Hartwell

Time	Latitude	Longitude	Activity	Weather	Cloud cover	Glare	Visibility	Wind speed	Sea State	Swell Height	Comments
643	34d19.39'	120d56.51'	survey	slight haze	none	low	6-8km	9nm	slight chop	1-2'	
1400	34d23.93'	119d58.81'	survey	clear	none	low	10km	3nm	calm	1-2'	

Date: 9/26/16 — Monitor: Steve Hartwell

Time	Latitude	Longitude	Activity	Weather	Cloud cover	Glare	Visibility	Wind speed	Sea State	Swell Height	Comments
932	34d01.11'	120d16.46'	survey	clear	none	high	10km	3nm	calm	1-2'	

Marine Wildlife Observation Report
U.S. Geological Survey Research Cruise 2016-666-FA
Santa Barbara Channel, California
September 13-14 and September 28 – October 4, 2016

Summary

On September 13-14 and September 28 – October 4, 2016, the Pacific Coastal and Marine Science Center of the U.S Geological Survey (USGS) conducted a geophysical survey collecting bathymetry, acoustic-backscatter, and sparker seismic reflection data in the Santa Barbara Channel. The work was conducted aboard the 36-foot USGS Research Vessel *Parke Snavely* out of the Santa Barbara harbor. The survey was conducted to support geoharzard research including mapping offshore faults, submarine landslides, and investigating how fluid and natural gas flows through the subsurface and expels from the seabed, a process that influences slope stability.

The USGS research cruise 2016-666-FA took place over two legs; September 13-14 and September 28 – October 4, 2016. All operations, including transits and surveying took place during daylight hours (0630 – 1730). Mapping was completed using both a pole-mounted 100-kHz Reson 7111 multibeam echosounder and a towed 100-1000 Hz sparker at survey speeds of 4-6 knots. While surveying in California State Waters a safety radius of 500-m was observed for all wildlife. During both legs a total of 43 sightings of wildlife were made including sea lions, dolphins, and whales. There were a total of 11 shutdowns. During all wildlife sightings the crew did not observe any abnormal behavior and there was no risk of collision. Figure 1 shows the locations of the sightings and other operational notes in relation to the survey track lines. Table 1 summarizes the date, time, and location of the wildlife observation or operational note.

USGS *RV Parke Snavely* September-October 2016
Survey in the Santa Barbara Channel, CA

Wildlife observation or other operational note

Survey Trackline

Limit of California State Waters

Isla Vista

Santa Barbara

Santa Barbara Channel

120°

119°40'

34°20'

0 5 10 Kilometers

Date	Time (GMT)	Longitude	Latitude	Line
9/13/16	14:51:39	-119.7550085	34.3234755	SOL: patch_01
9/13/16	15:06:46	-119.747252	34.33822017	EOL: patch_01
9/13/16	15:08:34	-119.7472345	34.33816683	SOL: patch_01_recip
9/13/16	15:25:20	-119.7548572	34.32395817	EOL: patch_01_recip
9/13/16	15:27:44	-119.7566233	34.32491267	SOL: patch_02
9/13/16	15:41:56	-119.7493482	34.33866917	EOL: patch_02
9/13/16	16:04:35	-119.7252368	34.3399955	SOL: seismic_01
9/13/16	16:07:27	-119.7219975	34.3400205	EOL: seismic_01
9/13/16	18:41:15	-120.0291337	34.34484633	SOL: AreaA_02
9/13/16	20:55:50	-120.2161562	34.37598183	EOL: AreaA_02
9/13/16	21:48:30	-120.2045072	34.3678895	SOL: AreaA_01
9/13/16	23:53:24	-120.0243682	34.33829783	EOL: AreaA_01
9/13/16	23:53:55	-120.0236488	34.33816817	SOL: AreaB_01
9/14/16	0:02:09	-120.0133608	34.33564417	EOL: AreaB_01
9/14/16	14:54:06	-119.8816992	34.31686217	SOL: AreaB_03
9/14/16	16:37:21	-120.0213927	34.35087533	EOL: AreaB_03
9/14/16	17:19:49	-120.0114207	34.34921067	SOL: AreaA_03
9/14/16	18:47:26	-120.1206063	34.36696233	EOL: AreaA_03
9/14/16	19:04:50	-120.113501	34.365927	SOL: AreaA_03_A
9/14/16	20:23:57	-120.2134068	34.3823225	EOL: AreaA_03_A
9/14/16	20:58:55	-120.2107803	34.38880233	SOL: AreaA_04
9/14/16	23:06:51	-120.0177963	34.35705767	EOL: AreaA_04
9/28/16	15:19:35	-119.7551995	34.32331967	SOL: patch_01_leg2
9/28/16	15:33:20	-119.7471513	34.33838667	EOL: patch_01_leg2
9/28/16	15:36:28	-119.7478542	34.33706567	SOL: patch_01_leg2_recip
9/28/16	15:48:34	-119.7553965	34.32295567	EOL: patch_01_leg2_recip
9/28/16	15:51:34	-119.756959	34.32447117	SOL: patch_02_leg2
9/28/16	16:05:25	-119.7493248	34.33875517	EOL: patch_02_leg2
9/28/16	16:49:31	-119.7552517	34.32323217	SOL: patch_01_leg2_try2
9/28/16	17:03:26	-119.7473558	34.33797167	EOL: patch_01_leg2_try2
9/28/16	17:05:57	-119.7478122	34.3371275	SOL: patch_01_leg2_recip_try2
9/28/16	17:18:22	-119.7549782	34.32371117	EOL: patch_01_leg2_recip_try2
9/28/16	17:20:43	-119.7569847	34.32439617	SOL: patch_02_leg2_try2
9/28/16	17:32:21	-119.7504402	34.3366585	EOL: patch_02_leg2_try2
9/28/16	19:06:38	-120.0179737	34.36549817	SOL: AreaA_05_2
9/28/16	21:02:48	-120.2081208	34.3969425	EOL: AreaA_05_2
9/28/16	21:37:45	-120.204703	34.40511317	SOL: AreaA_06
9/28/16	23:30:11	-120.0165008	34.374068	EOL: AreaA_06
9/28/16	23:32:21	-120.0155993	34.37393417	SOL: AreaA_06_B
9/28/16	23:34:18	-120.0127812	34.37345883	EOL: AreaA_06_B
9/29/16	15:50:19	-119.9963272	34.378865	SOL: AreaA_07
9/29/16	18:14:17	-120.2143642	34.410043	EOL: AreaA_07
9/29/16	18:58:37	-120.2029398	34.42100733	SOL: AreaA_08
9/29/16	20:02:21	-120.1067308	34.40522533	EOL: AreaA_08
9/29/16	20:02:32	-120.106435	34.40517967	SOL: AreaA_08_B
9/29/16	21:09:38	-120.0065087	34.3886675	EOL: AreaA_08_B
9/29/16	21:43:56	-120.0053337	34.39273	SOL: AreaB_004
9/29/16	22:34:49	-119.9290918	34.37367917	EOL: AreaB_004

9/29/16	22:43:09	-119.9284728	34.3735605	SOL: AreaB_004_B
9/29/16	23:36:02	-119.8530392	34.355292	EOL: AreaB_004_B
9/30/16	15:29:46	-120.005	34.394	SOL: AreaA_09
9/30/16	16:17:48	-120.102154	34.40873567	EOL: AreaA_09
9/30/16	16:22:32	-120.104	34.41	SOL: AreaA_09_B
9/30/16	17:21:11	-120.2003703	34.4259115	EOL: AreaA_09_B
9/30/16	17:53:13	-120.2009505	34.430502	SOL: AreaA_10
9/30/16	19:56:28	-120.003987	34.398014	EOL: AreaA_10
9/30/16	21:06:57	-120.005	34.397	SOL: AreaB_002
9/30/16	??	-119.863	34.362	EOL: AreaB_002
9/30/16	22:25:36	-119.866	34.353	SOL: AreaB_005
9/30/16	22:39:55	-119.872967	34.355229	EOL: AreaB_005
9/30/16	23:07:06	-119.882317	34.35741283	SOL: AreaB_005_B
9/30/16	23:32:16	-119.906514	34.36459967	EOL: AreaB_005_B
10/1/16	15:13:01	-119.9040327	34.36284133	SOL: AreaB_005_C
10/1/16	15:23:23	-119.917472	34.36610733	EOL: AreaB_005_C
10/1/16	15:44:36	-119.916	34.366	SOL: AreaB_005_D
10/1/16	16:21:28	-120.0044142	34.387296	EOL: AreaB_005_D
10/1/16	17:14:00	-119.9971632	34.37889217	SOL: AreaB_006
10/1/16	18:44:30	-119.8684595	34.34792117	EOL: AreaB_006
10/1/16	18:57:31	-119.8816878	34.34377783	SOL: AreaB_007
10/1/16	20:42:48	-120.0021768	34.36540717	EOL: AreaB_007
10/1/16	20:42:57	-120.0020068	34.365359	SOL: AreaB_008
10/1/16	22:13:44	-119.8744748	34.33420317	EOL: AreaB_008
10/2/16	15:19:18	-119.8894345	34.33137367	SOL: AreaB_009
10/2/16	17:21:56	-119.985006	34.34837883	EOL: AreaB_009
10/2/16	17:22:32	-119.9842095	34.34822067	SOL: AreaB_010
10/2/16	18:45:52	-119.882949	34.31481567	EOL: AreaB_010
10/2/16	18:54:33	-119.891967	34.312237	SOL: AreaB_011
10/2/16	??	-119.905	34.316	EOL: AreaB_011
10/2/16	20:29:58	-119.5935328	34.31204783	SOL: Habitat_001
10/2/16	21:23:35	-119.5902358	34.24920983	EOL: Habitat_001
10/2/16	21:26:53	-119.5849535	34.25017233	SOL: Habitat_002
10/2/16	22:04:24	-119.5832833	34.29870517	EOL: Habitat_002
10/3/16	15:36:15	-119.6210302	34.28989283	SOL: habitat_003
10/3/16	17:24:25	-119.6219302	34.2762455	EOL: habitat_003
10/3/16	17:24:54	-119.621103	34.276193	SOL: habitat_004
10/3/16	18:19:42	-119.5453355	34.27664217	EOL: habitat_004
10/3/16	18:38:28	-119.5487152	34.29675467	SOL: Habitat_005
10/3/16	19:11:32	-119.5891688	34.29655133	EOL: Habitat_005
10/3/16	19:21:36	-119.581906	34.2976685	SOL: Habitat_005_B
10/3/16	19:47:35	-119.61994	34.300016	EOL: Habitat_005_B
10/3/16	19:54:13	-119.6166948	34.30758367	SOL: habitat_006
10/3/16	20:32:21	-119.5487297	34.30565733	EOL: habitat_006
10/3/16	20:34:34	-119.5490323	34.30404283	SOL: habitat_007
10/3/16	21:04:24	-119.5755852	34.2960945	EOL: habitat_007
10/4/16	14:40:20	-119.5833502	34.29381067	SOL: Habitat_002_B
10/4/16	15:33:27	-119.5670137	34.313128	EOL: Habitat_002_B
10/4/16	15:35:41	-119.5702223	34.31184083	SOL: habitat_008

10/4/16	16:02:28	-119.6165215	34.31289267	EOL: habitat_008
10/4/16	16:12:46	-119.6043387	34.31396733	SOL: habitat_009
10/4/16	17:01:41	-119.6068995	34.25268683	EOL: habitat_009
10/4/16	17:41:32	-119.6250278	34.26745317	SOL: habitat_010
10/4/16	18:37:23	-119.5644912	34.26185467	EOL: habitat_010
10/4/16	18:42:30	-119.5736437	34.26408433	SOL: habitat_011
10/4/16	19:20:58	-119.5717128	34.31842933	EOL: habitat_011
10/4/16	19:21:57	-119.5723692	34.31962483	SOL: habitat_012
10/4/16	20:18:42	-119.6420992	34.37327967	EOL: habitat_012

long	lat	date	time	obser#	obser
-119.68622	34.4077743	9/13/16	14:03:37	1	4 dolphins 30-m distance, off bow, to the south, leaving harbor, Snavely transit out of harbor
-119.7458	34.3358072	9/13/16	14:23:46	2	transitting patch area looking for fishing gear
-119.75522	34.3239572	9/13/16	14:42:46	3	reson 7111 on, begin ramp up
-119.75535	34.3227437	9/13/16	14:50:12	4	sonar full power
-119.75182	34.3340692	9/13/16	15:37:10	5	2 dolphins, 300-m distance, to the north, swimming west. Snavely survey in federal waters
-119.73986	34.3397515	9/13/16	15:51:48	6	about 10 dolphins, 20-m distance, to the north, traveling east. reson 7111 at low power
-119.7194	34.3401433	9/13/16	16:12:36	7	2-4 sea lions, 50-m distance, to the south, swimming northeast, turn reson 7111 and seismic off
-119.715	34.3511095	9/13/16	16:17:14	8	transit back to harbor for crew change
-119.68321	34.4047307	9/13/16	16:59:17	9	3-4 sea lions on buoy outside harbor, 40-m distance, to the north, they are out of water, Snavely is transitting
-120.01876	34.3446677	9/13/16	17:57:32	10	reson 7111 on,begin ramp-up
-120.01876	34.3451708	9/13/16	18:10:24	11	sonar at full power
-120.01873	34.3452025	9/13/16	18:11:14	12	whale, 1 humpback, reson 7111 turned off, 200-m distance, to the east, dove
-120.01821	34.345789	9/13/16	18:20:43	13	1 whale, 1000-m distance, towards the south, dove, snavely stationary
-120.01817	34.3459812	9/13/16	18:23:01	14	reson 7111 on, begin ramp-up
-120.02351	34.345332	9/13/16	18:35:00	15	sparker on, reson 7111 at full power
-120.09594	34.35625	9/13/16	19:24:23	16	YoNav computer crashed, back up and running now
-120.10002	34.3568937	9/13/16	19:26:55	17	yonav going down
-120.11266	34.3589793	9/13/16	19:44:13	18	YoNav back up
-120.12437	34.360896	9/13/16	19:51:18	19	yonav computer going down
-120.01333	34.3356382	9/14/16	0:02:12	20	sparker and reson systems off
-119.77127	34.3699525	9/14/16	0:44:16	21	worked in federal water all day today
-119.69132	34.4071668	9/14/16	1:02:35	22	at dock

-119.68798	34.408695	9/14/16	13:44:07	23	leave dock
-119.8698	34.3143605	9/14/16	14:29:19	24	reson 7111 on, start ramp-up
-119.88121	34.3167272	9/14/16	14:53:45	25	reson 7111 full power
-119.88338	34.3172835	9/14/16	14:55:17	26	sparker on
-120.02207	34.3510495	9/14/16	16:38:05	27	sparker off
-120.0185	34.3504353	9/14/16	17:27:07	28	sparker on
					whale, 800-m distance, to the southwest, breach. Snavely is
-120.04076	34.3537925	9/14/16	17:42:10	29	surveying
-120.12061	34.3669623	9/14/16	18:38:20	30	lost power to vessel
-120.11466	34.3639782	9/14/16	19:00:08	31	ship power back on
-120.11653	34.3662992	9/14/16	19:07:47	32	sparker back on
-120.19855	34.386888	9/14/16	21:07:59	33	sparker on
-120.01096	34.355857	9/14/16	23:12:59	34	sparker off
-120.01063	34.3501942	9/14/16	23:41:14	35	reson 7111 off
-119.69097	34.4062127	9/15/16	0:46:47	36	inside harbor
					many dolphins, 50-m to the south, swimming east. Snavely
-119.75715	34.322617	9/28/16	14:53:34	37	staionary, sonar not on
-119.75744	34.3218328	9/28/16	15:17:19	38	reson 7111 on
					many dolphins, 30-m distance, all around, swimmming east,
-119.752	34.329276	9/28/16	15:25:03	39	snavely surveying
-119.86285	34.3490635	9/28/16	18:00:44	40	reson 7111 off
					many dolphin, all around, generally swimming northwest,
-119.8802	34.3506352	9/28/16	18:03:00	41	sonar off, Snavely transitting
					many dolphins, all around, 300m distance, swimming east,
-119.96236	34.3593768	9/28/16	18:13:50	42	sonar is off, snavely is transitting
-120.01754	34.3654278	9/28/16	19:06:22	43	reson 7111 on
-120.11717	34.394203	9/28/16	22:27:33	44	buoys in the area
-120.01239	34.3733803	9/28/16	23:34:47	45	reson 7111 turned off
					sea lion, 20-m off port side, to the north. swimming, sonar is
-119.88275	34.3792282	9/28/16	23:56:18	46	off, snavely is transitting

-119.69149	34.4070068	9/29/16	0:34:46	47	at dock
-119.97622	34.3828992	9/29/16	14:53:28	48	left dock around 7 am
-120.01249	34.3812778	9/29/16	15:06:13	49	reson 7111 on, begin ramp-up
-119.99963	34.37942	9/29/16	15:53:12	50	sparker on
					over 20 dolphins, 30-m distance, to the north, swimming
-120.08193	34.3930065	9/29/16	16:43:24	51	east. Snavely surveying
					sealion, 50-m distance, off bow, to the west, swimming,
-120.08498	34.3935053	9/29/16	16:45:17	52	shutting down sonars
-120.08344	34.393206	9/29/16	16:49:27	53	sonars back on, begin ramp-up
					100's of dolphins, over 500-m distance, to the north,
-120.08567	34.394017	9/29/16	16:51:00	54	swimming east
					less than 20 dophins, within 5-m distance, swam towards us.
-120.10209	34.3963192	9/29/16	17:00:56	55	swimming all around, snavely surveying
					dolphins and sealion, 200-m distance, to the north. swimming
-120.11128	34.3978207	9/29/16	17:06:30	56	east, snavely surveying to the west
					whale, over 1-km distance, to the west, sounding and fluke,
-120.12486	34.400096	9/29/16	17:14:46	57	snavely surveying
					2 sealions, 50-m distance, to the southwest, on surface,
-120.1367	34.4020267	9/29/16	17:22:07	58	shutting down sonars
-120.13503	34.4017115	9/29/16	17:26:09	59	sonars back on, begin ramp-up
					dolphins, 150-m distance, to the south, swimming east,
-120.16207	34.4062067	9/29/16	17:42:33	60	snavely surveying
					100's of dolphins, over 1km distance, to the southwest,
-120.16994	34.4075058	9/29/16	17:47:17	61	jumping, snavely surveing. A couple swam over to the snavely
					whale, dolphins, sealions, 1-km distance, to the southwest,
-120.20272	34.4128417	9/29/16	18:07:03	62	snavely surveying
					about 50 dolphins, about 100-m distance to the southwest,
-120.22125	34.414533	9/29/16	11:43:00	63	sparker off
-120.20493	34.421355	9/29/16	18:56:42	64	sparker back on after SVP"

-120.13157	34.4092968	9/29/16	19:46:00	65	sealion, 250-m distance, to the northeast, swimming south, snavely surveying
-120.05384	34.3964887	9/29/16	20:38:23	66	couple dozen dolphins, 800-m distance, to the northeast, swimming northwest, snavely surveying
-119.96752	34.3832027	9/29/16	22:09:08	67	couple dozen dolphins, 400-m distance, to the north, swimming west, snavely surveying
-119.9303	34.3739855	9/29/16	22:33:56	68	many dolphins, 500-m distance, off bow, to the east, swimming west, turning sonars off, in state waters
-119.92981	34.3739977	9/29/16	22:42:16	69	sonars back on, begin ramp-up
-119.8539	34.3554348	9/29/16	23:34:56	70	sparker off
-119.85217	34.3558073	9/29/16	23:39:20	71	reson 7111 off
-119.69073	34.406945	9/30/16	0:27:03	72	inside harbor
-119.68916	34.4077793	9/30/16	13:48:35	73	leave dock
-119.99999	34.3880807	9/30/16	14:53:29	74	reson 7111 on begin ramp-up
-120.01107	34.394717	9/30/16	15:13:03	75	sparker on
-120.10462	34.4102177	9/30/16	16:13:31	76	sealion, 20-m distance, to the north, swimming east, shut down sonars
-120.10417	34.4100522	9/30/16	16:19:42	77	sonars back on
-120.16413	34.4244507	9/30/16	18:17:04	78	whale, greater than 1-km distance, to the south, snavely surveying
-119.95657	34.3854955	9/30/16	21:00:19	79	many dolphins, 500-m distance, to the east, heading west, approaching snavely, shutting down sonars
-119.95781	34.3861232	9/30/16	21:05:59	80	sonars back on
-119.87232	34.3550278	9/30/16	22:25:41	81	over 100 dolphins, all around, heading north, snavely survey in federal waters
-119.87914	34.3567763	9/30/16	22:29:56	82	dolphins, within 500-m, towards the south, heading north, snavely surveying in state waters, turning sonars off
-119.87239	34.3589653	9/30/16	22:55:00	83	sonars back on
-119.90044	34.3619148	9/30/16	23:18:42	84	dolphins within 500-m, towards the west, swimming east, snavely surveying in state waters, turning off sonars

-119.90669	34.3647778	9/30/16	23:33:08	85	end survey for the day
-119.68871	34.4084447	10/1/16	0:11:09	86	inside harbor
-119.68897	34.3989193	10/1/16	13:51:17	87	left dock around 6:40
-119.89188	34.3598452	10/1/16	14:59:10	88	reson 7111 on, begin ramp-up
-119.90643	34.3634005	10/1/16	15:15:20	89	sparker on
-119.87143	34.3342928	10/1/16	22:19:42	90	sonars off
-119.69181	34.4053375	10/1/16	23:22:17	91	at fuel dock
-119.87726	34.3271817	10/2/16	14:57:22	92	reson 7111 on begin ramp-up
-119.90498	34.3351438	10/2/16	15:30:22	93	dolphins, over 500-m distance, to the south, swimming east, snavely surveying
-119.91611	34.3379043	10/2/16	15:38:10	94	many dolphins, 20-m distance, all around, generally swimmming northeast, snavely survey
-119.88299	34.314708	10/2/16	18:45:56	95	sealion, 20-m distance, to the south, shutting down reson 7111. Sparker not on today
-119.89098	34.311991	10/2/16	18:53:52	96	sonar back on
-119.90484	34.3160443	10/2/16	19:07:30	97	reson 7111 off. conditions deteroriated
-119.59771	34.315722	10/2/16	20:06:23	98	transit over for Habitat platform survey
-119.59779	34.315884	10/2/16	20:08:28	99	reson 7111 on, begin power-up
-119.59354	34.3119927	10/2/16	20:30:01	100	sparker on
-119.57108	34.2998243	10/2/16	22:16:02	101	reson 7111 and sparker off
-119.68488	34.407681	10/2/16	22:55:32	102	inside harbor
-119.69387	34.2990512	10/3/16	14:45:19	103	about 10 dolphins, 200-m distance to the south, swimming north. Snavely transit, sonars off
-119.68818	34.297783	10/3/16	14:46:19	104	10/21/16
-119.62883	34.2902035	10/3/16	15:26:50	105	reson 7111 on
-119.62114	34.2899083	10/3/16	15:36:06	106	sparker on
-119.58484	34.2883483	10/3/16	16:02:47	107	sealions, 70-m distance, to the north, snavely surveying, turning sonars off
-119.58208	34.2882408	10/3/16	16:04:37	108	sonars back on
-119.6083	34.3254528	10/3/16	21:40:56	109	sonars off

-119.69031	34.4070362	10/3/16	21:44:38	110	inside harbor
-119.68395	34.4049835	10/4/16	13:44:17	111	leave harbor
-119.58437	34.2944192	10/4/16	14:24:31	112	reson 7111 on begin ramp-up
-119.58342	34.295467	10/4/16	14:40:00	113	4-6 sealions on Habitat tender buoy, out of water, 200-m distance to the south
-119.58335	34.2938762	10/4/16	14:40:22	114	spaker on
-119.60863	34.2555622	10/4/16	17:18:54	115	about 12 dolphins, 10-m distance, swimming towards us going east. Snavely transit
-119.62789	34.2619318	10/4/16	17:29:38	116	about 12 dolphins, 10-m distance, swimming east, snavely transit
-119.60711	34.3463098	10/4/16	19:50:17	117	about 20 dolphins, 500-m distance, to the southeast, swimming east, snavely surveying
-119.6276	34.3620762	10/4/16	20:06:56	118	5 dolphins, 50-m distance, to the south, swimming east, snavely surveying
-119.68559	34.4080913	10/4/16	20:37:25	119	inside harbor

Mitigation Measure (MM)	Location and Scope of Mitigation	Effectiveness Criteria	Monitoring or Reporting Action	Responsible Party	Timing	Implementation Date(s) and Initials
Air Quality and Greenhouse Gas (GHG) Emissions (MND Section 3.3.3)						
MM AIR-1: Engine Tuning, Engine Certification, and Fuels. The following measures will be required to be implemented by all Permittees under the Offshore Geophysical Permit Program (OGPP), as applicable depending on the county offshore which a survey is being conducted. Pursuant to section 93118.5 of CARB's Airborne Toxic Control Measures, the Tier 2 engine requirement applies only to diesel-fueled vessels.	All Counties: Maintain all construction equipment in proper tune according to manufacturers' specifications; fuel all off-road and portable diesel-powered equipment with California Air Resources Board (CARB)-certified motor vehicle diesel fuel limiting sulfur content to 15 parts per million or less (CARB Diesel).	Daily emissions of criteria pollutants during survey activities are minimized.	Determine engine certification of vessel engines. Review engine emissions data to assess compliance, determine if changes in tuning or fuel are required.	OGPP permit holder and contract vessel operator; California State Lands Commission (CSLC) review of Final Monitoring Report.	Prior to, during, and after survey activities. Submit Final Monitoring Report after completion of survey activities.	8/16/16 JW
	Los Angeles and Orange Counties: Use vessel engines meeting CARB's Tier 2-certified engines or cleaner; the survey shall be operated such that daily NO_x emissions do not exceed 100 pounds based on engine certification emission factors. This can be accomplished with Tier 2 engines if daily fuel use is 585 gallons or less, and with Tier 3 engines if daily fuel use is 935 gallons or less.		Verify that Tier 2 or cleaner engines are being used. Calculate daily NO_x emissions to verify compliance with limitations.			
	San Luis Obispo County: Use vessel engines meeting CARB's Tier 2-certified engines or cleaner, accomplished with Tier 2 engines if daily fuel use is 585 gallons or less; all diesel equipment shall not idle for more than 5 minutes; engine use needed to maintain position in the water is not considered idling; diesel idling within 300 meters (1,000 feet) of sensitive receptors is not permitted; use alternatively fueled construction equipment on site where feasible, such as compressed natural gas, liquefied natural gas, propane or biodiesel.		Verify that Tier 2 or cleaner engines are being used. Inform vessel operator(s) of idling limitation. Investigate availability of alternative fuels.			
	Santa Barbara County: Use vessel engines meeting CARB's Tier 2-certified engines or cleaner, accomplished with Tier 2 engines if daily fuel use is 790 gallons or less.		Verify that Tier 2 or cleaner engines are being used. Investigate availability of alternative fuels.			8/16/16 JW
	Ventura County: Use alternatively fueled construction equipment on site where feasible, such as compressed natural gas, liquefied natural gas, propane or biodiesel.		Investigate availability of alternative fuels.			

Mitigation Measure (MM)	Location and Scope of Mitigation	Effectiveness Criteria	Monitoring or Reporting Action	Responsible Party	Timing	Implementation Date(s) and Initials
MM BIO-1: Marine Mammal and Sea Turtle Presence – Current Information.	All State waters; prior to commencement of survey operations, the geophysical operator shall: (1) contact the National Oceanic and Atmospheric Administration Long Beach office staff and local whale-watching operations and shall acquire information on the current composition and relative abundance of marine wildlife offshore, and (2) convey sightings data to the vessel operator and crew, survey party chief, and onboard Marine Wildlife Monitors (MWMs) prior to departure. This information will aid the MWMs by providing data on the approximate number and types of organisms that may be in the area.	No adverse effects to marine mammals or sea turtles due to survey activities are observed.	Document contact with appropriate sources. Submit Final Monitoring Report after completion of survey activities.	OGPP permit holder; Inquiry to NOAA and local whale watching operators.	Prior to survey.	8/16/16
MM BIO-2: Marine Wildlife Monitors (MWMs).	Except as provided in section 7(h) of the General Permit, a minimum of two (2) qualified MWMs who are experienced in marine wildlife observations shall be onboard the survey vessel throughout both transit and data collection activities. The specific monitoring, observation, and data collection responsibilities shall be identified in the Marine Wildlife Contingency Plan required as part of all Offshore Geophysical Permit Program permits. Qualifications of proposed MWMs shall be submitted to the National Oceanic and Atmospheric Administration (NOAA) and CSLC at least twenty-one (21) days in advance of the survey for their approval by the agencies. Survey operations shall not commence until the CSLC approves the MWMs.	Competent and professional monitoring or marine mammals and sea turtles; compliance with established monitoring policies.	Document contact with and approval by appropriate agencies. Submit Final Monitoring Report after completion of survey activities.	OGPP permit holder.	Prior to survey.	8/16/16
MM BIO-3: Safety Zone Monitoring.	Onboard Marine Wildlife Monitors (MWMs) responsible for observations during vessel transit shall be responsible for monitoring during the survey equipment operations. All visual monitoring shall occur from the highest practical vantage point aboard the survey vessel; binoculars shall be used to observe the surrounding area, as appropriate. The MWMs will survey an area (i.e., safety or exclusion zone) based on the equipment used, centered on the sound source (i.e., vessel, towfish), throughout time that the survey equipment is operating. Safety zone radial distances, by equipment type, include:	No adverse effects to marine mammals or sea turtles due to survey activities are observed; compliance with established safety zones.	Compliance with permit requirements (observers); compliance with established safety zones. Submit Final Monitoring Report after completion of survey activities.	OGPP permit holder.	Prior to survey.	8/16/16

<table>
<tr><th>Mitigation Measure (MM)</th><th>Location and Scope of Mitigation</th><th>Effectiveness Criteria</th><th>Monitoring or Reporting Action</th><th>Responsible Party</th><th>Timing</th><th>Implementation Date(s) and Initials</th></tr>
<tr><td></td><td>
<table>
<tr><th>Equipment Type</th><th>Safety Zone (radius, m)</th></tr>
<tr><td>Single Beam Echosounder</td><td>50</td></tr>
<tr><td>Multibeam Echosounder</td><td>500</td></tr>
<tr><td>Side-Scan Sonar</td><td>600</td></tr>
<tr><td>Subbottom Profiler</td><td>100</td></tr>
<tr><td>Boomer System</td><td>100</td></tr>
</table>
If the geophysical survey equipment is operated at or above a frequency of 200 kilohertz (kHz), safety zone monitoring and enforcement is not required; however, if geophysical survey equipment operated at a frequency at or above 200 kHz is used simultaneously with geophysical survey equipment less than 200 kHz, then the safety zone for the equipment less than 200 kHz must be monitored. The onboard MWMs shall have authority to stop operations if a mammal or turtle is observed within the specified safety zone and may be negatively affected by survey activities. The MWMs shall also have authority to recommend continuation (or cessation) of operations during periods of limited visibility (i.e., fog, rain) based on the observed abundance of marine wildlife. Periodic reevaluation of weather conditions and reassessment of the continuation/cessation recommendation shall be completed by the onboard MWMs. During operations, if an animal's actions are observed to be irregular, the monitor shall have authority to recommend that equipment be shut down until the animal moves further away from the sound source. If irregular behavior is observed, the equipment shall be shut-off and will be restarted and ramped-up to full power, as applicable, or will not be started until the animal(s) is/are outside of the safety zone or have not been observed for 15 minutes.

For nearshore survey operations utilizing vessels that lack the personnel capacity to hold two (2) MWMs aboard during survey operations, at least twenty-one (21) days prior to the commencement of survey activities, the Permittee may petition the CSLC to conduct survey operations with one (1) MWM aboard. The CSLC will consider such authorization on a case-by-case basis and</td><td></td><td></td><td></td><td></td><td>8/16/16
gw</td></tr>
</table>

Mitigation Measure (MM)	Location and Scope of Mitigation	Effectiveness Criteria	Monitoring or Reporting Action	Responsible Party	Timing	Implementation Date(s) and Initials
	factors the CSLC will consider will include the timing, type, and location of the survey, the size of the vessel, and the availability of alternate vessels for conducting the proposed survey. CSLC authorizations under this subsection will be limited to individual surveys and under any such authorization; the Permittee shall update the MWCP to reflect how survey operations will occur under the authorization.					
MM BIO-4: Limits on Nighttime OGPP Surveys.	All State waters; nighttime survey operations are prohibited under the OGPP, except as provided below. The CSLC will consider the use of single beam echosounders and passive equipment types at night on a case-by-case basis, taking into consideration the equipment specifications, location, timing, and duration of survey activity.	No adverse effects to marine mammals or sea turtles due to survey activities are observed.	Presurvey request for nighttime operations, including equipment specifications and proposed use schedule. Document equipment use. Submit Final Monitoring Report after completion of survey activities.	OGPP permit holder.	Approval required before survey is initiated. Monitoring Report following comple-tion of survey.	8/16/16
MM BIO-5: Soft Start.	All State waters; the survey operator shall use a "soft start" technique at the beginning of survey activities each day (or following a shut down) to allow any marine mammal that may be in the immediate area to leave before the sound sources reach full energy. Surveys shall not commence at nighttime or when the safety zone cannot be effectively monitored. Operators shall initiate each piece of equipment at the lowest practical sound level, increasing output in such a manner as to increase in steps not exceeding approximately 6 decibels (dB) per 5-minute period. During ramp-up, the Marine Wildlife Monitors (MWMs) shall monitor the safety zone. If marine mammals are sighted within or about to enter the safety zone, a power-down or shut down shall be implemented as though the equipment was operating at full power. Initiation of ramp-up procedures from shut down requires that the MWMs be able to visually observe the full safety zone.	No adverse effects to marine mammals or sea turtles due to survey activities are observed.	Compliance with permit requirements (observers); compliance with safe start procedures. Submit Final Monitoring Report after completion of survey activities.	OGPP permit holder.	Imme-diately prior to survey.	9/13/16

Mitigation Measure (MM)	Location and Scope of Mitigation	Effectiveness Criteria	Monitoring or Reporting Action	Responsible Party	Timing	Implementation Date(s) and Initials
MM BIO-6: Practical Limitations on Equipment Use and Adherence to Equipment Manufacturer's Routine Maintenance Schedule.	All State waters; geophysical operators shall follow, to the maximum extent possible, the guidelines of Zykov (2013) as they pertain to the use of subbottom profilers and side-scan sonar, including: • Using the highest frequency band possible for the subbottom profiler; • Using the shortest possible pulse length; and • Lowering the pulse rate (pings per second) as much as feasible. Geophysical operators shall consider the potential applicability of these measures to other equipment types (e.g., boomer). Permit holders will conduct routine inspection and maintenance of acoustic-generating equipment to ensure that low energy geophysical equipment used during permitted survey activities remains in proper working order and within manufacturer's equipment specifications. Verification of the date and occurrence of such equipment inspection and maintenance shall be provided in the required presurvey notification to CSLC.	No adverse effects to marine mammals or sea turtles due to survey activities are observed.	Document initial and during survey equipment settings. Submit Final Monitoring Report after completion of survey activities.	OGPP permit holder.	Imme-diately prior to and during survey.	9/13/16
MM BIO-7: Avoidance of Pinniped Haul-Out Sites.	The Marine Wildlife Contingency Plan (MWCP) developed and implemented for each survey shall include identification of haul-out sites within or immediately adjacent to the proposed survey area. For surveys within 300 meters (m) of a haul-out site, the MWCP shall further require that: • The survey vessel shall not approach within 91 m of a haul-out site, consistent with National Marine Fisheries Service (NMFS) guidelines; • Survey activity close to haul-out sites shall be conducted in an expedited manner to minimize the potential for disturbance of pinnipeds on land; and • Marine Wildlife Monitors shall monitor pinniped activity onshore as the vessel approaches, observing and reporting on the number of pinnipeds potentially disturbed (e.g., via head lifting, flushing into the water). The purpose of such reporting is to provide CSLC and California Department of Fish and Wildlife (CDFW) with information regarding potential disturbance associated with OGPP surveys.	No adverse effects to pinnipeds at haul outs are observed.	Document pinniped reactions to vessel presence and equipment use. Submit Final Monitoring Report after completion of survey activities.	OGPP permit holder.	Monitoring Report following comple-tion of survey.	8/16/16

Mitigation Measure (MM)	Location and Scope of Mitigation	Effectiveness Criteria	Monitoring or Reporting Action	Responsible Party	Timing	Implementation Date(s) and Initials
MM BIO-8: Reporting Requirements – Collision.	All State waters; if a collision with marine mammal or reptile occurs, the vessel operator shall document the conditions under which the accident occurred, including the following: • Vessel location (latitude, longitude) when the collision occurred; • Date and time of collision; • Speed and heading of the vessel at the time of collision; • Observation conditions (e.g., wind speed and direction, swell height, visibility in miles or kilometers, and presence of rain or fog) at the time of collision; • Species of marine wildlife contacted (if known); • Whether an observer was monitoring marine wildlife at the time of collision; and, • Name of vessel, vessel owner/operator, and captain officer in charge of the vessel at time of collision. After a collision, the vessel shall stop, if safe to do so; however, the vessel is not obligated to stand by and may proceed after confirming that it will not further damage the animal by doing so. The vessel will then immediately communicate by radio or telephone all details to the vessel's base of operations, and shall immediately report the incident. Consistent with Marine Mammal Protection Act requirements, the vessel's base of operations or, if an onboard telephone is available, the vessel captain him/herself, will then immediately call the National Oceanic and Atmospheric Administration (NOAA) Stranding Coordinator to report the collision and follow any subsequent instructions. From the report, the Stranding Coordinator will coordinate subsequent action, including enlisting the aid of marine mammal rescue organizations, if appropriate. From the vessel's base of operations, a telephone call will be placed to the Stranding Coordinator, NOAA National Marine Fisheries Service (NMFS), Southwest Region, Long Beach, to obtain instructions. Although NOAA has primary responsibility for marine mammals in both State and Federal waters, the California Department of Fish and Wildlife (CDFW) will also be advised that an incident has occurred in State waters affecting a protected species.	No adverse effects to marine mammals or sea turtles due to survey activities are observed.	Submit Final Monitoring Report after completion of survey activities.	OGPP permit holder.	Monitoring Report following comple-tion of survey.	8/16/16

Mitigation Measure (MM)	Location and Scope of Mitigation	Effectiveness Criteria	Monitoring or Reporting Action	Responsible Party	Timing	Implementation Date(s) and Initials
MM BIO-9: Limitations on Survey Operations in Select Marine Protected Areas (MPAs).	All MPAs; prior to commencing survey activities, geophysical operators shall coordinate with the CLSC, California Department of Fish and Wildlife (CDFW), and any other appropriate permitting agency regarding proposed operations within MPAs. The scope and purpose of each survey proposed within a MPA shall be defined by the permit holder, and the applicability of the survey to the allowable MPA activities shall be delineated by the permit holder. If deemed necessary by CDFW, geophysical operators will pursue a scientific collecting permit, or other appropriate authorization, to secure approval to work within a MPA, and shall provide a copy of such authorization to the CSLC as part of the required presurvey notification to CSLC. CSLC, CDFW, and/or other permitting agencies may impose further restrictions on survey activities as conditions of approval.	No adverse effects to MPA resources due to survey activities are observed.	Monitor reactions of wildlife to survey operations; report on shutdown conditions and survey restart. Submit Final Monitoring Report after completion of survey activities.	OGPP permit holder; survey permitted by CDFW.	Prior to survey.	8/16/16
MM HAZ-1: Oil Spill Contingency Plan (OSCP) Required Information.	Permittees shall develop and submit to CSLC staff for review and approval an OSCP that addresses accidental releases of petroleum and/or non-petroleum products during survey operations. Permittees' OSCPs shall include the following information for each vessel to be involved with the survey: • Specific steps to be taken in the event of a spill, including notification names, phone numbers, and locations of: (1) nearby emergency medical facilities, and (2) wildlife rescue/response organizations (e.g., Oiled Wildlife Care Network); • Description of crew training and equipment testing procedures; and • Description, quantities, and location of spill response equipment onboard the vessel.	Reduction in the potential for an accidental spill. Proper and timely response and notification of responsible parties in the event of a spill.	Documentation of proper spill training. Notification of responsible parties in the event of a spill.	OGPP permit holder and contract vessel operator.	Prior to survey.	8/16/16
MM HAZ-2: Vessel fueling restrictions.	Vessel fueling shall only occur at an approved docking facility. No cross vessel fueling shall be allowed.	Reduction in the potential for an accidental spill.	Documentation of fueling activities.	Contract vessel operator.	Following survey.	10/4/16
MM HAZ-3: OSCP equipment and supplies.	Onboard spill response equipment and supplies shall be sufficient to contain and recover the worst-case scenario spill of petroleum products as outlined in the OSCP.	Proper and timely response in the event of a spill.	Notification to CSLC of onboard spill response equipment/supplies inventory, verify	Contract vessel operator.	Prior to survey.	8/16/16

Mitigation Measure (MM)	Location and Scope of Mitigation	Effectiveness Criteria	Monitoring or Reporting Action	Responsible Party	Timing	Implementation Date(s) and Initials
			ability to respond to worst-case spill.			
MM HAZ-1: Oil Spill Contingency Plan (OSCP) Required Information.	Outlined under **Hazards and Hazardous Materials** (above)					
MM HAZ-2: Vessel fueling restrictions.	Outlined under **Hazards and Hazardous Materials** (above)					
MM HAZ-3: OSCP equipment and supplies.	Outlined under **Hazards and Hazardous Materials** (above)					
MM BIO-9: Limitations on Survey Operations in Select MPAs.	Outlined under **Biological Resources** (above)					
MM REC-1: U.S. Coast Guard (USCG), Harbormaster, and Dive Shop Operator Notification.	All California waters where recreational diving may occur; as a survey permit condition, the CSLC shall require Permittees to provide the USCG with survey details, including information on vessel types, survey locations, times, contact information, and other details of activities that may pose a hazard to divers so that USCG can include the information in the Local Notice to Mariners, advising vessels to avoid potential hazards near survey areas. Furthermore, at least twenty-one (21) days in advance of in-water activities, Permittees shall: (1) post such notices in the harbormasters' offices of regional harbors; and (2) notify operators of dive shops in coastal locations adjacent to the proposed offshore survey operations.	No adverse effects to recreational divers from survey operations.	Notify the USCG, local harbormasters, and local dive shops of planned survey activity. Submit Final Monitoring Report after completion of survey activities.	OGPP permit holder.	Prior to survey.	8/16/16

Mitigation Measure (MM)	Location and Scope of Mitigation	Effectiveness Criteria	Monitoring or Reporting Action	Responsible Party	Timing	Implementation Date(s) and Initials
MM FISH-1: U.S. Coast Guard (USCG) and Harbormaster Notification.	All California waters; as a survey permit condition, the CSLC shall require Permittees to provide the USCG with survey details, including information on vessel types, survey locations, times, contact information, and other details of activities that may pose a hazard to mariners and fishers so that USCG can include the information in the Local Notice to Mariners, advising vessels to avoid potential hazards near survey areas. Furthermore, at least twenty-one (21) days in advance of in-water activities, Permittees shall post such notices in the harbormasters' offices of regional harbors.	No adverse effects to commercial fishing gear in place.	Notify the USCG and local harbormasters of planned survey activity. Submit Final Monitoring Report after completion of survey activities.	OGPP permit holder.	Prior to survey.	8/16/16
MM FISH-2: Minimize Interaction with Fishing Gear.	To minimize interaction with fishing gear that may be present within a survey area: (1) the geophysical vessel (or designated vessel) shall traverse the proposed survey corridor prior to commencing survey operations to note and record the presence, type, and location of deployed fishing gear (i.e., buoys); (2) no survey lines within 30 m (100 feet) of observed fishing gear shall be conducted. The survey crew shall not remove or relocate any fishing gear; removal or relocation shall only be accomplished by the owner of the gear upon notification by the survey operator of the potential conflict.	No adverse effects to commercial fishing gear in place.	Visually observe the survey area for commercial fishing gear. Notify the gear owner and request relocation of gear outside survey area. Submit Final Monitoring Report after completion of survey activities.	OGPP permit holder.	Imme-diately prior to survey (prior to each survey day).	9/13/16
MM FISH-1: USCG and Harbormaster Notification.	Outlined under **Commercial and Recreational Fisheries** (above)					

Acronyms/Abbreviations: CARB = California Air Resources Board; CDFW = California Department of Fish and Wildlife; CSLC = California State Lands Commission; dB = decibels; kHz = kilohertz; MPA = Marine Protected Area; MWCP = Marine Wildlife Contingency Plan; MWM = Marine Wildlife Monitor; m= meter(s); NOAA = National Oceanic and Atmospheric Administration; NO_x = Nitrogen Oxide; OGPP = Offshore Geophysical Permit Program; OSCP = Oil Spill Contingency Plan; USCG = U.S. Coast Guard

Date	Time (GMT)	Longitude	Latitude	Line
9/13/16	14:51:39	-119.7550085	34.3234755	SOL: patch_01
9/13/16	15:06:46	-119.747252	34.33822017	EOL: patch_01
9/13/16	15:08:34	-119.7472345	34.33816683	SOL: patch_01_recip
9/13/16	15:25:20	-119.7548572	34.32395817	EOL: patch_01_recip
9/13/16	15:27:44	-119.7566233	34.32491267	SOL: patch_02
9/13/16	15:41:56	-119.7493482	34.33866917	EOL: patch_02
9/13/16	16:04:35	-119.7252368	34.3399955	SOL: seismic_01
9/13/16	16:07:27	-119.7219975	34.3400205	EOL: seismic_01
9/13/16	18:41:15	-120.0291337	34.34484633	SOL: AreaA_02
9/13/16	20:55:50	-120.2161562	34.37598183	EOL: AreaA_02
9/13/16	21:48:30	-120.2045072	34.3678895	SOL: AreaA_01
9/13/16	23:53:24	-120.0243682	34.33829783	EOL: AreaA_01
9/13/16	23:53:55	-120.0236488	34.33816817	SOL: AreaB_01
9/14/16	0:02:09	-120.0133608	34.33564417	EOL: AreaB_01
9/14/16	14:54:06	-119.8816992	34.31686217	SOL: AreaB_03
9/14/16	16:37:21	-120.0213927	34.35087533	EOL: AreaB_03
9/14/16	17:19:49	-120.0114207	34.34921067	SOL: AreaA_03
9/14/16	18:47:26	-120.1206063	34.36696233	EOL: AreaA_03
9/14/16	19:04:50	-120.113501	34.365927	SOL: AreaA_03_A
9/14/16	20:23:57	-120.2134068	34.3823225	EOL: AreaA_03_A
9/14/16	20:58:55	-120.2107803	34.38880233	SOL: AreaA_04
9/14/16	23:06:51	-120.0177963	34.35705767	EOL: AreaA_04
9/28/16	15:19:35	-119.7551995	34.32331967	SOL: patch_01_leg2
9/28/16	15:33:20	-119.7471513	34.33838667	EOL: patch_01_leg2
9/28/16	15:36:28	-119.7478542	34.33706567	SOL: patch_01_leg2_recip
9/28/16	15:48:34	-119.7553965	34.32295567	EOL: patch_01_leg2_recip
9/28/16	15:51:34	-119.756959	34.32447117	SOL: patch_02_leg2
9/28/16	16:05:25	-119.7493248	34.33875517	EOL: patch_02_leg2
9/28/16	16:49:31	-119.7552517	34.32323217	SOL: patch_01_leg2_try2
9/28/16	17:03:26	-119.7473558	34.33797167	EOL: patch_01_leg2_try2
9/28/16	17:05:57	-119.7478122	34.3371275	SOL: patch_01_leg2_recip_try2
9/28/16	17:18:22	-119.7549782	34.32371117	EOL: patch_01_leg2_recip_try2
9/28/16	17:20:43	-119.7569847	34.32439617	SOL: patch_02_leg2_try2
9/28/16	17:32:21	-119.7504402	34.3366585	EOL: patch_02_leg2_try2
9/28/16	19:06:38	-120.0179737	34.36549817	SOL: AreaA_05_2
9/28/16	21:02:48	-120.2081208	34.3969425	EOL: AreaA_05_2
9/28/16	21:37:45	-120.204703	34.40511317	SOL: AreaA_06
9/28/16	23:30:11	-120.0165008	34.374068	EOL: AreaA_06
9/28/16	23:32:21	-120.0155993	34.37393417	SOL: AreaA_06_B
9/28/16	23:34:18	-120.0127812	34.37345883	EOL: AreaA_06_B
9/29/16	15:50:19	-119.9963272	34.378865	SOL: AreaA_07
9/29/16	18:14:17	-120.2143642	34.410043	EOL: AreaA_07
9/29/16	18:58:37	-120.2029398	34.42100733	SOL: AreaA_08
9/29/16	20:02:21	-120.1067308	34.40522533	EOL: AreaA_08
9/29/16	20:02:32	-120.106435	34.40517967	SOL: AreaA_08_B
9/29/16	21:09:38	-120.0065087	34.3886675	EOL: AreaA_08_B
9/29/16	21:43:56	-120.0053337	34.39273	SOL: AreaB_004
9/29/16	22:34:49	-119.9290918	34.37367917	EOL: AreaB_004

9/29/16	22:43:09	-119.9284728	34.3735605	SOL: AreaB_004_B
9/29/16	23:36:02	-119.8530392	34.355292	EOL: AreaB_004_B
9/30/16	15:29:46	-120.005	34.394	SOL: AreaA_09
9/30/16	16:17:48	-120.102154	34.40873567	EOL: AreaA_09
9/30/16	16:22:32	-120.104	34.41	SOL: AreaA_09_B
9/30/16	17:21:11	-120.2003703	34.4259115	EOL: AreaA_09_B
9/30/16	17:53:13	-120.2009505	34.430502	SOL: AreaA_10
9/30/16	19:56:28	-120.003987	34.398014	EOL: AreaA_10
9/30/16	21:06:57	-120.005	34.397	SOL: AreaB_002
9/30/16	??	-119.863	34.362	EOL: AreaB_002
9/30/16	22:25:36	-119.866	34.353	SOL: AreaB_005
9/30/16	22:39:55	-119.872967	34.355229	EOL: AreaB_005
9/30/16	23:07:06	-119.882317	34.35741283	SOL: AreaB_005_B
9/30/16	23:32:16	-119.906514	34.36459967	EOL: AreaB_005_B
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10/1/16	15:23:23	-119.917472	34.36610733	EOL: AreaB_005_C
10/1/16	15:44:36	-119.916	34.366	SOL: AreaB_005_D
10/1/16	16:21:28	-120.0044142	34.387296	EOL: AreaB_005_D
10/1/16	17:14:00	-119.9971632	34.37889217	SOL: AreaB_006
10/1/16	18:44:30	-119.8684595	34.34792117	EOL: AreaB_006
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10/1/16	22:13:44	-119.8744748	34.33420317	EOL: AreaB_008
10/2/16	15:19:18	-119.8894345	34.33137367	SOL: AreaB_009
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10/2/16	17:22:32	-119.9842095	34.34822067	SOL: AreaB_010
10/2/16	18:45:52	-119.882949	34.31481567	EOL: AreaB_010
10/2/16	18:54:33	-119.891967	34.312237	SOL: AreaB_011
10/2/16	??	-119.905	34.316	EOL: AreaB_011
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10/2/16	21:23:35	-119.5902358	34.24920983	EOL: Habitat_001
10/2/16	21:26:53	-119.5849535	34.25017233	SOL: Habitat_002
10/2/16	22:04:24	-119.5832833	34.29870517	EOL: Habitat_002
10/3/16	15:36:15	-119.6210302	34.28989283	SOL: habitat_003
10/3/16	17:24:25	-119.6219302	34.2762455	EOL: habitat_003
10/3/16	17:24:54	-119.621103	34.276193	SOL: habitat_004
10/3/16	18:19:42	-119.5453355	34.27664217	EOL: habitat_004
10/3/16	18:38:28	-119.5487152	34.29675467	SOL: Habitat_005
10/3/16	19:11:32	-119.5891688	34.29655133	EOL: Habitat_005
10/3/16	19:21:36	-119.581906	34.2976685	SOL: Habitat_005_B
10/3/16	19:47:35	-119.61994	34.300016	EOL: Habitat_005_B
10/3/16	19:54:13	-119.6166948	34.30758367	SOL: habitat_006
10/3/16	20:32:21	-119.5487297	34.30565733	EOL: habitat_006
10/3/16	20:34:34	-119.5490323	34.30404283	SOL: habitat_007
10/3/16	21:04:24	-119.5755852	34.2960945	EOL: habitat_007
10/4/16	14:40:20	-119.5833502	34.29381067	SOL: Habitat_002_B
10/4/16	15:33:27	-119.5670137	34.313128	EOL: Habitat_002_B
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10/4/16	16:12:46	-119.6043387	34.31396733	SOL: habitat_009
10/4/16	17:01:41	-119.6068995	34.25268683	EOL: habitat_009
10/4/16	17:41:32	-119.6250278	34.26745317	SOL: habitat_010
10/4/16	18:37:23	-119.5644912	34.26185467	EOL: habitat_010
10/4/16	18:42:30	-119.5736437	34.26408433	SOL: habitat_011
10/4/16	19:20:58	-119.5717128	34.31842933	EOL: habitat_011
10/4/16	19:21:57	-119.5723692	34.31962483	SOL: habitat_012
10/4/16	20:18:42	-119.6420992	34.37327967	EOL: habitat_012

Marine Wildlife Observation Report
U.S. Geological Survey Research Cruise 2016-666-FA
Santa Barbara Channel, California
September 13-14 and September 28 – October 4, 2016

Summary

On September 13-14 and September 28 – October 4, 2016, the Pacific Coastal and Marine Science Center of the U.S Geological Survey (USGS) conducted a geophysical survey collecting bathymetry, acoustic-backscatter, and sparker seismic reflection data in the Santa Barbara Channel. The work was conducted aboard the 36-foot USGS Research Vessel *Parke Snavely* out of the Santa Barbara harbor. The survey was conducted to support geoharzard research including mapping offshore faults, submarine landslides, and investigating how fluid and natural gas flows through the subsurface and expels from the seabed, a process that influences slope stability.

The USGS research cruise 2016-666-FA took place over two legs; September 13-14 and September 28 – October 4, 2016. All operations, including transits and surveying took place during daylight hours (0630 – 1730). Mapping was completed using both a pole-mounted 100-kHz Reson 7111 multibeam echosounder and a towed 100-1000 Hz sparker at survey speeds of 4-6 knots. While surveying in California State Waters a safety radius of 500-m was observed for all wildlife. During both legs a total of 43 sightings of wildlife were made including sea lions, dolphins, and whales. There were a total of 11 shutdowns. During all wildlife sightings the crew did not observe any abnormal behavior and there was no risk of collision. Figure 1 shows the locations of the sightings and other operational notes in relation to the survey track lines. Table 1 summarizes the date, time, and location of the wildlife observation or operational note.

USGS *RV Parke Snavely* September-October 2016
Survey in the Santa Barbara Channel, CA

Wildlife observation or other operational note

Survey Trackline

Limit of California State Waters

Isla Vista

Santa Barbara

Santa Barbara Channel

120°

119°40'

34°20'

0 5 10 Kilometers

long	lat	date	time	obser#	obser
-119.68622	34.4077743	9/13/16	14:03:37	1	4 dolphins 30-m distance, off bow, to the south, leaving harbor, Snavely transit out of harbor
-119.7458	34.3358072	9/13/16	14:23:46	2	transitting patch area looking for fishing gear
-119.75522	34.3239572	9/13/16	14:42:46	3	reson 7111 on, begin ramp up
-119.75535	34.3227437	9/13/16	14:50:12	4	sonar full power
-119.75182	34.3340692	9/13/16	15:37:10	5	2 dolphins, 300-m distance, to the north, swimming west. Snavely survey in federal waters
-119.73986	34.3397515	9/13/16	15:51:48	6	about 10 dolphins, 20-m distance, to the north, traveling east. reson 7111 at low power
-119.7194	34.3401433	9/13/16	16:12:36	7	2-4 sea lions, 50-m distance, to the south, swimming northeast, turn reson 7111 and seismic off
-119.715	34.3511095	9/13/16	16:17:14	8	transit back to harbor for crew change
-119.68321	34.4047307	9/13/16	16:59:17	9	3-4 sea lions on buoy outside harbor, 40-m distance, to the north, they are out of water, Snavely is transitting
-120.01876	34.3446677	9/13/16	17:57:32	10	reson 7111 on,begin ramp-up
-120.01876	34.3451708	9/13/16	18:10:24	11	sonar at full power
-120.01873	34.3452025	9/13/16	18:11:14	12	whale, 1 humpback, reson 7111 turned off, 200-m distance, to the east, dove
-120.01821	34.345789	9/13/16	18:20:43	13	1 whale, 1000-m distance, towards the south, dove, snavely stationary
-120.01817	34.3459812	9/13/16	18:23:01	14	reson 7111 on, begin ramp-up
-120.02351	34.345332	9/13/16	18:35:00	15	sparker on, reson 7111 at full power
-120.09594	34.35625	9/13/16	19:24:23	16	YoNav computer crashed, back up and running now
-120.10002	34.3568937	9/13/16	19:26:55	17	yonav going down
-120.11266	34.3589793	9/13/16	19:44:13	18	YoNav back up
-120.12437	34.360896	9/13/16	19:51:18	19	yonav computer going down
-120.01333	34.3356382	9/14/16	0:02:12	20	sparker and reson systems off
-119.77127	34.3699525	9/14/16	0:44:16	21	worked in federal water all day today
-119.69132	34.4071668	9/14/16	1:02:35	22	at dock

-119.68798	34.408695	9/14/16	13:44:07	23	leave dock
-119.8698	34.3143605	9/14/16	14:29:19	24	reson 7111 on, start ramp-up
-119.88121	34.3167272	9/14/16	14:53:45	25	reson 7111 full power
-119.88338	34.3172835	9/14/16	14:55:17	26	sparker on
-120.02207	34.3510495	9/14/16	16:38:05	27	sparker off
-120.0185	34.3504353	9/14/16	17:27:07	28	sparker on
					whale, 800-m distance, to the southwest, breach. Snavely is
-120.04076	34.3537925	9/14/16	17:42:10	29	surveying
-120.12061	34.3669623	9/14/16	18:38:20	30	lost power to vessel
-120.11466	34.3639782	9/14/16	19:00:08	31	ship power back on
-120.11653	34.3662992	9/14/16	19:07:47	32	sparker back on
-120.19855	34.386888	9/14/16	21:07:59	33	sparker on
-120.01096	34.355857	9/14/16	23:12:59	34	sparker off
-120.01063	34.3501942	9/14/16	23:41:14	35	reson 7111 off
-119.69097	34.4062127	9/15/16	0:46:47	36	inside harbor
					many dolphins, 50-m to the south, swimming east. Snavely
-119.75715	34.322617	9/28/16	14:53:34	37	staionary, sonar not on
-119.75744	34.3218328	9/28/16	15:17:19	38	reson 7111 on
					many dolphins, 30-m distance, all around, swimmming east,
-119.752	34.329276	9/28/16	15:25:03	39	snavely surveying
-119.86285	34.3490635	9/28/16	18:00:44	40	reson 7111 off
					many dolphin, all around, generally swimming northwest,
-119.8802	34.3506352	9/28/16	18:03:00	41	sonar off, Snavely transitting
					many dolphins, all around, 300m distance, swimming east,
-119.96236	34.3593768	9/28/16	18:13:50	42	sonar is off, snavely is transitting
-120.01754	34.3654278	9/28/16	19:06:22	43	reson 7111 on
-120.11717	34.394203	9/28/16	22:27:33	44	buoys in the area
-120.01239	34.3733803	9/28/16	23:34:47	45	reson 7111 turned off
					sea lion, 20-m off port side, to the north. swimming, sonar is
-119.88275	34.3792282	9/28/16	23:56:18	46	off, snavely is transitting

-119.69149	34.4070068	9/29/16	0:34:46	47	at dock
-119.97622	34.3828992	9/29/16	14:53:28	48	left dock around 7 am
-120.01249	34.3812778	9/29/16	15:06:13	49	reson 7111 on, begin ramp-up
-119.99963	34.37942	9/29/16	15:53:12	50	sparker on
					over 20 dolphins, 30-m distance, to the north, swimming
-120.08193	34.3930065	9/29/16	16:43:24	51	east. Snavely surveying
					sealion, 50-m distance, off bow, to the west, swimming,
-120.08498	34.3935053	9/29/16	16:45:17	52	shutting down sonars
-120.08344	34.393206	9/29/16	16:49:27	53	sonars back on, begin ramp-up
					100's of dolphins, over 500-m distance, to the north,
-120.08567	34.394017	9/29/16	16:51:00	54	swimming east
					less than 20 dophins, within 5-m distance, swam towards us.
-120.10209	34.3963192	9/29/16	17:00:56	55	swimming all around, snavely surveying
					dolphins and sealion, 200-m distance, to the north. swimming
-120.11128	34.3978207	9/29/16	17:06:30	56	east, snavely surveying to the west
					whale, over 1-km distance, to the west, sounding and fluke,
-120.12486	34.400096	9/29/16	17:14:46	57	snavely surveying
					2 sealions, 50-m distance, to the southwest, on surface,
-120.1367	34.4020267	9/29/16	17:22:07	58	shutting down sonars
-120.13503	34.4017115	9/29/16	17:26:09	59	sonars back on, begin ramp-up
					dolphins, 150-m distance, to the south, swimming east,
-120.16207	34.4062067	9/29/16	17:42:33	60	snavely surveying
					100's of dolphins, over 1km distance, to the southwest,
-120.16994	34.4075058	9/29/16	17:47:17	61	jumping, snavely surveing. A couple swam over to the snavely
					whale, dolphins, sealions, 1-km distance, to the southwest,
-120.20272	34.4128417	9/29/16	18:07:03	62	snavely surveying
					about 50 dolphins, about 100-m distance to the southwest,
-120.22125	34.414533	9/29/16	11:43:00	63	sparker off
-120.20493	34.421355	9/29/16	18:56:42	64	sparker back on after SVP"

-120.13157	34.4092968	9/29/16	19:46:00	65	sealion, 250-m distance, to the northeast, swimming south, snavely surveying
-120.05384	34.3964887	9/29/16	20:38:23	66	couple dozen dolphins, 800-m distance, to the northeast, swimming northwest, snavely surveying
-119.96752	34.3832027	9/29/16	22:09:08	67	couple dozen dolphins, 400-m distance, to the north, swimming west, snavely surveying
-119.9303	34.3739855	9/29/16	22:33:56	68	many dolphins, 500-m distance, off bow, to the east, swimming west, turning sonars off, in state waters
-119.92981	34.3739977	9/29/16	22:42:16	69	sonars back on, begin ramp-up
-119.8539	34.3554348	9/29/16	23:34:56	70	sparker off
-119.85217	34.3558073	9/29/16	23:39:20	71	reson 7111 off
-119.69073	34.406945	9/30/16	0:27:03	72	inside harbor
-119.68916	34.4077793	9/30/16	13:48:35	73	leave dock
-119.99999	34.3880807	9/30/16	14:53:29	74	reson 7111 on begin ramp-up
-120.01107	34.394717	9/30/16	15:13:03	75	sparker on
-120.10462	34.4102177	9/30/16	16:13:31	76	sealion, 20-m distance, to the north, swimming east, shut down sonars
-120.10417	34.4100522	9/30/16	16:19:42	77	sonars back on
-120.16413	34.4244507	9/30/16	18:17:04	78	whale, greater than 1-km distance, to the south, snavely surveying
-119.95657	34.3854955	9/30/16	21:00:19	79	many dolphins, 500-m distance, to the east, heading west, approaching snavely, shutting down sonars
-119.95781	34.3861232	9/30/16	21:05:59	80	sonars back on
-119.87232	34.3550278	9/30/16	22:25:41	81	over 100 dolphins, all around, heading north, snavely survey in federal waters
-119.87914	34.3567763	9/30/16	22:29:56	82	dolphins, within 500-m, towards the south, heading north, snavely surveying in state waters, turning sonars off
-119.87239	34.3589653	9/30/16	22:55:00	83	sonars back on
-119.90044	34.3619148	9/30/16	23:18:42	84	dolphins within 500-m, towards the west, swimming east, snavely surveying in state waters, turning off sonars

-119.90669	34.3647778	9/30/16	23:33:08	85	end survey for the day
-119.68871	34.4084447	10/1/16	0:11:09	86	inside harbor
-119.68897	34.3989193	10/1/16	13:51:17	87	left dock around 6:40
-119.89188	34.3598452	10/1/16	14:59:10	88	reson 7111 on, begin ramp-up
-119.90643	34.3634005	10/1/16	15:15:20	89	sparker on
-119.87143	34.3342928	10/1/16	22:19:42	90	sonars off
-119.69181	34.4053375	10/1/16	23:22:17	91	at fuel dock
-119.87726	34.3271817	10/2/16	14:57:22	92	reson 7111 on begin ramp-up
-119.90498	34.3351438	10/2/16	15:30:22	93	dolphins, over 500-m distance, to the south, swimming east, snavely surveying
-119.91611	34.3379043	10/2/16	15:38:10	94	many dolphins, 20-m distance, all around, generally swimmming northeast, snavely survey
-119.88299	34.314708	10/2/16	18:45:56	95	sealion, 20-m distance, to the south, shutting down reson 7111. Sparker not on today
-119.89098	34.311991	10/2/16	18:53:52	96	sonar back on
-119.90484	34.3160443	10/2/16	19:07:30	97	reson 7111 off. conditions deteroriated
-119.59771	34.315722	10/2/16	20:06:23	98	transit over for Habitat platform survey
-119.59779	34.315884	10/2/16	20:08:28	99	reson 7111 on, begin power-up
-119.59354	34.3119927	10/2/16	20:30:01	100	sparker on
-119.57108	34.2998243	10/2/16	22:16:02	101	reson 7111 and sparker off
-119.68488	34.407681	10/2/16	22:55:32	102	inside harbor
-119.69387	34.2990512	10/3/16	14:45:19	103	about 10 dolphins, 200-m distance to the south, swimming north. Snavely transit, sonars off
-119.68818	34.297783	10/3/16	14:46:19	104	10/21/16
-119.62883	34.2902035	10/3/16	15:26:50	105	reson 7111 on
-119.62114	34.2899083	10/3/16	15:36:06	106	sparker on
-119.58484	34.2883483	10/3/16	16:02:47	107	sealions, 70-m distance, to the north, snavely surveying, turning sonars off
-119.58208	34.2882408	10/3/16	16:04:37	108	sonars back on
-119.6083	34.3254528	10/3/16	21:40:56	109	sonars off

-119.69031	34.4070362	10/3/16	21:44:38	110	inside harbor
-119.68395	34.4049835	10/4/16	13:44:17	111	leave harbor
-119.58437	34.2944192	10/4/16	14:24:31	112	reson 7111 on begin ramp-up
-119.58342	34.295467	10/4/16	14:40:00	113	4-6 sealions on Habitat tender buoy, out of water, 200-m distance to the south
-119.58335	34.2938762	10/4/16	14:40:22	114	spaker on
-119.60863	34.2555622	10/4/16	17:18:54	115	about 12 dolphins, 10-m distance, swimming towards us going east. Snavely transit
-119.62789	34.2619318	10/4/16	17:29:38	116	about 12 dolphins, 10-m distance, swimming east, snavely transit
-119.60711	34.3463098	10/4/16	19:50:17	117	about 20 dolphins, 500-m distance, to the southeast, swimming east, snavely surveying
-119.6276	34.3620762	10/4/16	20:06:56	118	5 dolphins, 50-m distance, to the south, swimming east, snavely surveying
-119.68559	34.4080913	10/4/16	20:37:25	119	inside harbor

Mitigation Measure (MM)	Location and Scope of Mitigation	Effectiveness Criteria	Monitoring or Reporting Action	Responsible Party	Timing	Implementation Date(s) and Initials
Air Quality and Greenhouse Gas (GHG) Emissions (MND Section 3.3.3)						
MM AIR-1: Engine Tuning, Engine Certification, and Fuels. The following measures will be required to be implemented by all Permittees under the Offshore Geophysical Permit Program (OGPP), as applicable depending on the county offshore which a survey is being conducted. Pursuant to section 93118.5 of CARB's Airborne Toxic Control Measures, the Tier 2 engine requirement applies only to diesel-fueled vessels.	All Counties: Maintain all construction equipment in proper tune according to manufacturers' specifications; fuel all off-road and portable diesel-powered equipment with California Air Resources Board (CARB)-certified motor vehicle diesel fuel limiting sulfur content to 15 parts per million or less (CARB Diesel).	Daily emissions of criteria pollutants during survey activities are minimized.	Determine engine certification of vessel engines. Review engine emissions data to assess compliance, determine if changes in tuning or fuel are required.	OGPP permit holder and contract vessel operator; California State Lands Commission (CSLC) review of Final Monitoring Report.	Prior to, during, and after survey activities. Submit Final Monitoring Report after completion of survey activities.	8/16/16 JW
	Los Angeles and Orange Counties: Use vessel engines meeting CARB's Tier 2-certified engines or cleaner; the survey shall be operated such that daily NO_x emissions do not exceed 100 pounds based on engine certification emission factors. This can be accomplished with Tier 2 engines if daily fuel use is 585 gallons or less, and with Tier 3 engines if daily fuel use is 935 gallons or less.		Verify that Tier 2 or cleaner engines are being used. Calculate daily NO_x emissions to verify compliance with limitations.			
	San Luis Obispo County: Use vessel engines meeting CARB's Tier 2-certified engines or cleaner, accomplished with Tier 2 engines if daily fuel use is 585 gallons or less; all diesel equipment shall not idle for more than 5 minutes; engine use needed to maintain position in the water is not considered idling; diesel idling within 300 meters (1,000 feet) of sensitive receptors is not permitted; use alternatively fueled construction equipment on site where feasible, such as compressed natural gas, liquefied natural gas, propane or biodiesel.		Verify that Tier 2 or cleaner engines are being used. Inform vessel operator(s) of idling limitation. Investigate availability of alternative fuels.			
	Santa Barbara County: Use vessel engines meeting CARB's Tier 2-certified engines or cleaner, accomplished with Tier 2 engines if daily fuel use is 790 gallons or less.		Verify that Tier 2 or cleaner engines are being used. Investigate availability of alternative fuels.			8/16/16 JW
	Ventura County: Use alternatively fueled construction equipment on site where feasible, such as compressed natural gas, liquefied natural gas, propane or biodiesel.		Investigate availability of alternative fuels.			

Mitigation Measure (MM)	Location and Scope of Mitigation	Effectiveness Criteria	Monitoring or Reporting Action	Responsible Party	Timing	Implementation Date(s) and Initials
MM BIO-1: Marine Mammal and Sea Turtle Presence – Current Information.	All State waters; prior to commencement of survey operations, the geophysical operator shall: (1) contact the National Oceanic and Atmospheric Administration Long Beach office staff and local whale-watching operations and shall acquire information on the current composition and relative abundance of marine wildlife offshore, and (2) convey sightings data to the vessel operator and crew, survey party chief, and onboard Marine Wildlife Monitors (MWMs) prior to departure. This information will aid the MWMs by providing data on the approximate number and types of organisms that may be in the area.	No adverse effects to marine mammals or sea turtles due to survey activities are observed.	Document contact with appropriate sources. Submit Final Monitoring Report after completion of survey activities.	OGPP permit holder; Inquiry to NOAA and local whale watching operators.	Prior to survey.	8/16/16
MM BIO-2: Marine Wildlife Monitors (MWMs).	Except as provided in section 7(h) of the General Permit, a minimum of two (2) qualified MWMs who are experienced in marine wildlife observations shall be onboard the survey vessel throughout both transit and data collection activities. The specific monitoring, observation, and data collection responsibilities shall be identified in the Marine Wildlife Contingency Plan required as part of all Offshore Geophysical Permit Program permits. Qualifications of proposed MWMs shall be submitted to the National Oceanic and Atmospheric Administration (NOAA) and CSLC at least twenty-one (21) days in advance of the survey for their approval by the agencies. Survey operations shall not commence until the CSLC approves the MWMs.	Competent and professional monitoring or marine mammals and sea turtles; compliance with established monitoring policies.	Document contact with and approval by appropriate agencies. Submit Final Monitoring Report after completion of survey activities.	OGPP permit holder.	Prior to survey.	8/16/16
MM BIO-3: Safety Zone Monitoring.	Onboard Marine Wildlife Monitors (MWMs) responsible for observations during vessel transit shall be responsible for monitoring during the survey equipment operations. All visual monitoring shall occur from the highest practical vantage point aboard the survey vessel; binoculars shall be used to observe the surrounding area, as appropriate. The MWMs will survey an area (i.e., safety or exclusion zone) based on the equipment used, centered on the sound source (i.e., vessel, towfish), throughout time that the survey equipment is operating. Safety zone radial distances, by equipment type, include:	No adverse effects to marine mammals or sea turtles due to survey activities are observed; compliance with established safety zones.	Compliance with permit requirements (observers); compliance with established safety zones. Submit Final Monitoring Report after completion of survey activities.	OGPP permit holder.	Prior to survey.	8/16/16

<table>
<tr><th>Mitigation Measure (MM)</th><th>Location and Scope of Mitigation</th><th>Effectiveness Criteria</th><th>Monitoring or Reporting Action</th><th>Responsible Party</th><th>Timing</th><th>Implementation Date(s) and Initials</th></tr>
<tr><td></td><td>
<table>
<tr><th>Equipment Type</th><th>Safety Zone (radius, m)</th></tr>
<tr><td>Single Beam Echosounder</td><td>50</td></tr>
<tr><td>Multibeam Echosounder</td><td>500</td></tr>
<tr><td>Side-Scan Sonar</td><td>600</td></tr>
<tr><td>Subbottom Profiler</td><td>100</td></tr>
<tr><td>Boomer System</td><td>100</td></tr>
</table>
If the geophysical survey equipment is operated at or above a frequency of 200 kilohertz (kHz), safety zone monitoring and enforcement is not required; however, if geophysical survey equipment operated at a frequency at or above 200 kHz is used simultaneously with geophysical survey equipment less than 200 kHz, then the safety zone for the equipment less than 200 kHz must be monitored. The onboard MWMs shall have authority to stop operations if a mammal or turtle is observed within the specified safety zone and may be negatively affected by survey activities. The MWMs shall also have authority to recommend continuation (or cessation) of operations during periods of limited visibility (i.e., fog, rain) based on the observed abundance of marine wildlife. Periodic reevaluation of weather conditions and reassessment of the continuation/cessation recommendation shall be completed by the onboard MWMs. During operations, if an animal's actions are observed to be irregular, the monitor shall have authority to recommend that equipment be shut down until the animal moves further away from the sound source. If irregular behavior is observed, the equipment shall be shut-off and will be restarted and ramped-up to full power, as applicable, or will not be started until the animal(s) is/are outside of the safety zone or have not been observed for 15 minutes.

For nearshore survey operations utilizing vessels that lack the personnel capacity to hold two (2) MWMs aboard during survey operations, at least twenty-one (21) days prior to the commencement of survey activities, the Permittee may petition the CSLC to conduct survey operations with one (1) MWM aboard. The CSLC will consider such authorization on a case-by-case basis and</td><td></td><td></td><td></td><td></td><td>8/16/16
gw</td></tr>
</table>

Mitigation Measure (MM)	Location and Scope of Mitigation	Effectiveness Criteria	Monitoring or Reporting Action	Responsible Party	Timing	Implementation Date(s) and Initials
	factors the CSLC will consider will include the timing, type, and location of the survey, the size of the vessel, and the availability of alternate vessels for conducting the proposed survey. CSLC authorizations under this subsection will be limited to individual surveys and under any such authorization; the Permittee shall update the MWCP to reflect how survey operations will occur under the authorization.					
MM BIO-4: Limits on Nighttime OGPP Surveys.	All State waters; nighttime survey operations are prohibited under the OGPP, except as provided below. The CSLC will consider the use of single beam echosounders and passive equipment types at night on a case-by-case basis, taking into consideration the equipment specifications, location, timing, and duration of survey activity.	No adverse effects to marine mammals or sea turtles due to survey activities are observed.	Presurvey request for nighttime operations, including equipment specifications and proposed use schedule. Document equipment use. Submit Final Monitoring Report after completion of survey activities.	OGPP permit holder.	Approval required before survey is initiated. Monitoring Report following comple-tion of survey.	8/16/16
MM BIO-5: Soft Start.	All State waters; the survey operator shall use a "soft start" technique at the beginning of survey activities each day (or following a shut down) to allow any marine mammal that may be in the immediate area to leave before the sound sources reach full energy. Surveys shall not commence at nighttime or when the safety zone cannot be effectively monitored. Operators shall initiate each piece of equipment at the lowest practical sound level, increasing output in such a manner as to increase in steps not exceeding approximately 6 decibels (dB) per 5-minute period. During ramp-up, the Marine Wildlife Monitors (MWMs) shall monitor the safety zone. If marine mammals are sighted within or about to enter the safety zone, a power-down or shut down shall be implemented as though the equipment was operating at full power. Initiation of ramp-up procedures from shut down requires that the MWMs be able to visually observe the full safety zone.	No adverse effects to marine mammals or sea turtles due to survey activities are observed.	Compliance with permit requirements (observers); compliance with safe start procedures. Submit Final Monitoring Report after completion of survey activities.	OGPP permit holder.	Imme-diately prior to survey.	9/13/16

Mitigation Measure (MM)	Location and Scope of Mitigation	Effectiveness Criteria	Monitoring or Reporting Action	Responsible Party	Timing	Implementation Date(s) and Initials
MM BIO-6: Practical Limitations on Equipment Use and Adherence to Equipment Manufacturer's Routine Maintenance Schedule.	All State waters; geophysical operators shall follow, to the maximum extent possible, the guidelines of Zykov (2013) as they pertain to the use of subbottom profilers and side-scan sonar, including: • Using the highest frequency band possible for the subbottom profiler; • Using the shortest possible pulse length; and • Lowering the pulse rate (pings per second) as much as feasible. Geophysical operators shall consider the potential applicability of these measures to other equipment types (e.g., boomer). Permit holders will conduct routine inspection and maintenance of acoustic-generating equipment to ensure that low energy geophysical equipment used during permitted survey activities remains in proper working order and within manufacturer's equipment specifications. Verification of the date and occurrence of such equipment inspection and maintenance shall be provided in the required presurvey notification to CSLC.	No adverse effects to marine mammals or sea turtles due to survey activities are observed.	Document initial and during survey equipment settings. Submit Final Monitoring Report after completion of survey activities.	OGPP permit holder.	Imme-diately prior to and during survey.	9/13/16
MM BIO-7: Avoidance of Pinniped Haul-Out Sites.	The Marine Wildlife Contingency Plan (MWCP) developed and implemented for each survey shall include identification of haul-out sites within or immediately adjacent to the proposed survey area. For surveys within 300 meters (m) of a haul-out site, the MWCP shall further require that: • The survey vessel shall not approach within 91 m of a haul-out site, consistent with National Marine Fisheries Service (NMFS) guidelines; • Survey activity close to haul-out sites shall be conducted in an expedited manner to minimize the potential for disturbance of pinnipeds on land; and • Marine Wildlife Monitors shall monitor pinniped activity onshore as the vessel approaches, observing and reporting on the number of pinnipeds potentially disturbed (e.g., via head lifting, flushing into the water). The purpose of such reporting is to provide CSLC and California Department of Fish and Wildlife (CDFW) with information regarding potential disturbance associated with OGPP surveys.	No adverse effects to pinnipeds at haul outs are observed.	Document pinniped reactions to vessel presence and equipment use. Submit Final Monitoring Report after completion of survey activities.	OGPP permit holder.	Monitoring Report following comple-tion of survey.	8/16/16

Mitigation Measure (MM)	Location and Scope of Mitigation	Effectiveness Criteria	Monitoring or Reporting Action	Responsible Party	Timing	Implementation Date(s) and Initials
MM BIO-8: Reporting Requirements – Collision.	All State waters; if a collision with marine mammal or reptile occurs, the vessel operator shall document the conditions under which the accident occurred, including the following: • Vessel location (latitude, longitude) when the collision occurred; • Date and time of collision; • Speed and heading of the vessel at the time of collision; • Observation conditions (e.g., wind speed and direction, swell height, visibility in miles or kilometers, and presence of rain or fog) at the time of collision; • Species of marine wildlife contacted (if known); • Whether an observer was monitoring marine wildlife at the time of collision; and, • Name of vessel, vessel owner/operator, and captain officer in charge of the vessel at time of collision. After a collision, the vessel shall stop, if safe to do so; however, the vessel is not obligated to stand by and may proceed after confirming that it will not further damage the animal by doing so. The vessel will then immediately communicate by radio or telephone all details to the vessel's base of operations, and shall immediately report the incident. Consistent with Marine Mammal Protection Act requirements, the vessel's base of operations or, if an onboard telephone is available, the vessel captain him/herself, will then immediately call the National Oceanic and Atmospheric Administration (NOAA) Stranding Coordinator to report the collision and follow any subsequent instructions. From the report, the Stranding Coordinator will coordinate subsequent action, including enlisting the aid of marine mammal rescue organizations, if appropriate. From the vessel's base of operations, a telephone call will be placed to the Stranding Coordinator, NOAA National Marine Fisheries Service (NMFS), Southwest Region, Long Beach, to obtain instructions. Although NOAA has primary responsibility for marine mammals in both State and Federal waters, the California Department of Fish and Wildlife (CDFW) will also be advised that an incident has occurred in State waters affecting a protected species.	No adverse effects to marine mammals or sea turtles due to survey activities are observed.	Submit Final Monitoring Report after completion of survey activities.	OGPP permit holder.	Monitoring Report following comple-tion of survey.	8/16/16

Mitigation Measure (MM)	Location and Scope of Mitigation	Effectiveness Criteria	Monitoring or Reporting Action	Responsible Party	Timing	Implementation Date(s) and Initials
MM BIO-9: Limitations on Survey Operations in Select Marine Protected Areas (MPAs).	All MPAs; prior to commencing survey activities, geophysical operators shall coordinate with the CLSC, California Department of Fish and Wildlife (CDFW), and any other appropriate permitting agency regarding proposed operations within MPAs. The scope and purpose of each survey proposed within a MPA shall be defined by the permit holder, and the applicability of the survey to the allowable MPA activities shall be delineated by the permit holder. If deemed necessary by CDFW, geophysical operators will pursue a scientific collecting permit, or other appropriate authorization, to secure approval to work within a MPA, and shall provide a copy of such authorization to the CSLC as part of the required presurvey notification to CSLC. CSLC, CDFW, and/or other permitting agencies may impose further restrictions on survey activities as conditions of approval.	No adverse effects to MPA resources due to survey activities are observed.	Monitor reactions of wildlife to survey operations; report on shutdown conditions and survey restart. Submit Final Monitoring Report after completion of survey activities.	OGPP permit holder; survey permitted by CDFW.	Prior to survey.	8/16/16
MM HAZ-1: Oil Spill Contingency Plan (OSCP) Required Information.	Permittees shall develop and submit to CSLC staff for review and approval an OSCP that addresses accidental releases of petroleum and/or non-petroleum products during survey operations. Permittees' OSCPs shall include the following information for each vessel to be involved with the survey: • Specific steps to be taken in the event of a spill, including notification names, phone numbers, and locations of: (1) nearby emergency medical facilities, and (2) wildlife rescue/response organizations (e.g., Oiled Wildlife Care Network); • Description of crew training and equipment testing procedures; and • Description, quantities, and location of spill response equipment onboard the vessel.	Reduction in the potential for an accidental spill. Proper and timely response and notification of responsible parties in the event of a spill.	Documentation of proper spill training. Notification of responsible parties in the event of a spill.	OGPP permit holder and contract vessel operator.	Prior to survey.	8/16/16
MM HAZ-2: Vessel fueling restrictions.	Vessel fueling shall only occur at an approved docking facility. No cross vessel fueling shall be allowed.	Reduction in the potential for an accidental spill.	Documentation of fueling activities.	Contract vessel operator.	Following survey.	10/4/16
MM HAZ-3: OSCP equipment and supplies.	Onboard spill response equipment and supplies shall be sufficient to contain and recover the worst-case scenario spill of petroleum products as outlined in the OSCP.	Proper and timely response in the event of a spill.	Notification to CSLC of onboard spill response equipment/supplies inventory, verify	Contract vessel operator.	Prior to survey.	8/16/16

Mitigation Measure (MM)	Location and Scope of Mitigation	Effectiveness Criteria	Monitoring or Reporting Action	Responsible Party	Timing	Implementation Date(s) and Initials
			ability to respond to worst-case spill.			
MM HAZ-1: Oil Spill Contingency Plan (OSCP) Required Information.	Outlined under **Hazards and Hazardous Materials** (above)					
MM HAZ-2: Vessel fueling restrictions.	Outlined under **Hazards and Hazardous Materials** (above)					
MM HAZ-3: OSCP equipment and supplies.	Outlined under **Hazards and Hazardous Materials** (above)					
MM BIO-9: Limitations on Survey Operations in Select MPAs.	Outlined under **Biological Resources** (above)					
MM REC-1: U.S. Coast Guard (USCG), Harbormaster, and Dive Shop Operator Notification.	All California waters where recreational diving may occur; as a survey permit condition, the CSLC shall require Permittees to provide the USCG with survey details, including information on vessel types, survey locations, times, contact information, and other details of activities that may pose a hazard to divers so that USCG can include the information in the Local Notice to Mariners, advising vessels to avoid potential hazards near survey areas. Furthermore, at least twenty-one (21) days in advance of in-water activities, Permittees shall: (1) post such notices in the harbormasters' offices of regional harbors; and (2) notify operators of dive shops in coastal locations adjacent to the proposed offshore survey operations.	No adverse effects to recreational divers from survey operations.	Notify the USCG, local harbormasters, and local dive shops of planned survey activity. Submit Final Monitoring Report after completion of survey activities.	OGPP permit holder.	Prior to survey.	8/16/16

Mitigation Measure (MM)	Location and Scope of Mitigation	Effectiveness Criteria	Monitoring or Reporting Action	Responsible Party	Timing	Implementation Date(s) and Initials
MM FISH-1: U.S. Coast Guard (USCG) and Harbormaster Notification.	All California waters; as a survey permit condition, the CSLC shall require Permittees to provide the USCG with survey details, including information on vessel types, survey locations, times, contact information, and other details of activities that may pose a hazard to mariners and fishers so that USCG can include the information in the Local Notice to Mariners, advising vessels to avoid potential hazards near survey areas. Furthermore, at least twenty-one (21) days in advance of in-water activities, Permittees shall post such notices in the harbormasters' offices of regional harbors.	No adverse effects to commercial fishing gear in place.	Notify the USCG and local harbormasters of planned survey activity. Submit Final Monitoring Report after completion of survey activities.	OGPP permit holder.	Prior to survey.	8/16/16
MM FISH-2: Minimize Interaction with Fishing Gear.	To minimize interaction with fishing gear that may be present within a survey area: (1) the geophysical vessel (or designated vessel) shall traverse the proposed survey corridor prior to commencing survey operations to note and record the presence, type, and location of deployed fishing gear (i.e., buoys); (2) no survey lines within 30 m (100 feet) of observed fishing gear shall be conducted. The survey crew shall not remove or relocate any fishing gear; removal or relocation shall only be accomplished by the owner of the gear upon notification by the survey operator of the potential conflict.	No adverse effects to commercial fishing gear in place.	Visually observe the survey area for commercial fishing gear. Notify the gear owner and request relocation of gear outside survey area. Submit Final Monitoring Report after completion of survey activities.	OGPP permit holder.	Imme-diately prior to survey (prior to each survey day).	9/13/16
MM FISH-1: USCG and Harbormaster Notification.	Outlined under **Commercial and Recreational Fisheries** (above)					

Acronyms/Abbreviations: CARB = California Air Resources Board; CDFW = California Department of Fish and Wildlife; CSLC = California State Lands Commission; dB = decibels; kHz = kilohertz; MPA = Marine Protected Area; MWCP = Marine Wildlife Contingency Plan; MWM = Marine Wildlife Monitor; m= meter(s); NOAA = National Oceanic and Atmospheric Administration; NO_x = Nitrogen Oxide; OGPP = Offshore Geophysical Permit Program; OSCP = Oil Spill Contingency Plan; USCG = U.S. Coast Guard